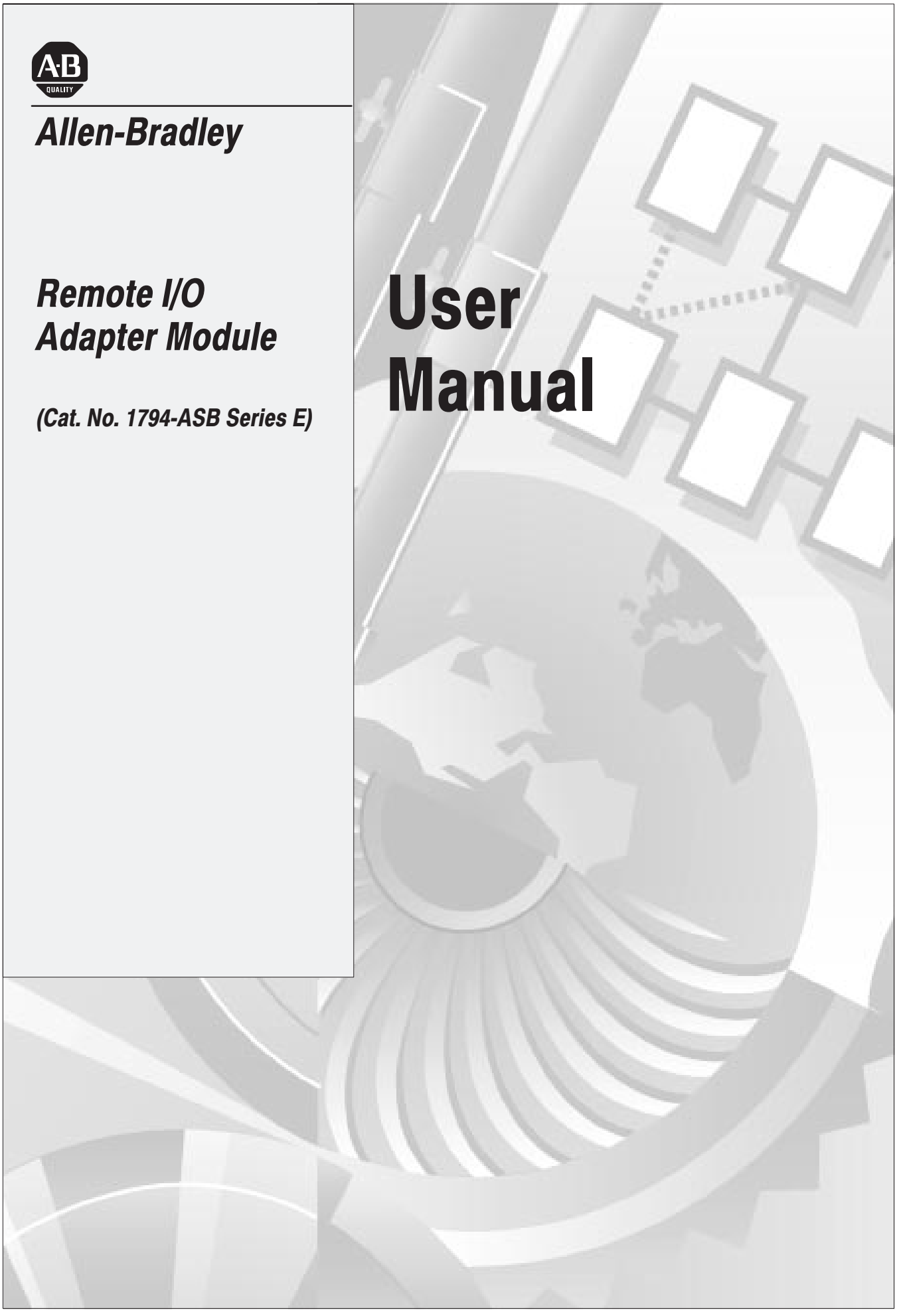


Allen-Bradley

Remote I/O Adapter Module

(Cat. No. 1794-ASB Series E)

User Manual

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of these products must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards. In no event will Allen–Bradley be responsible or liable for indirect or consequential damage resulting from the use or application of these products.

Any illustrations, charts, sample programs, and layout examples shown in this publication are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen–Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen–Bradley publication SGI–1.1, Safety Guidelines for Application, Installation, and Maintenance of Solid–State Control (available from your local Allen–Bradley office), describes some important differences between solid–state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

Reproduction of the contents of this copyrighted publication, in whole or part, without written permission of Rockwell Automation, is prohibited.

Throughout this publication, notes may be used to make you aware of safety considerations. The following annotations and their accompanying statements help you to identify a potential hazard. avoid a potential hazard, and recognize the consequences of a potential hazard.

WARNING

Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

ATTENTION

Identifies information about practices or circumstances that may lead to personal injury or death, property damage, or economic loss.

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

ATTENTION

Environment and Enclosure

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664–1), at altitudes up to 2000 meters without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

This equipment is supplied as “open type” equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present, and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosures. Also, see the appropriate sections in this publication, as well as the Allen–Bradley publication 1770–4.1, (“Industrial Automation Wiring and Grounding Guidelines”), for additional installation requirements pertaining to this equipment.

Summary of Changes

The information below summarizes the changes to the Remote I/O Adapter User Manual, publication 1794-UM009B–EN–P, since the last release.

New Information

The following new information is included in this version of the publication:

Series Change for the Adapter

This publication now covers the series E adapters. The series E adapter is capable of recognizing the safe state data for the FLEX Integra analog modules, and allows use of 32 point FLEX I/O modules. You must use a series D or later adapter when using FLEX Integra analog modules in your system.

Additional FLEX I/O Modules

New modules available since the last version of this publication have been added.

Change Bars

The areas in this manual which are different from previous editions are marked with change bars (as shown to the right of this paragraph) to indicate the addition of new or revised information.

Using This Manual

Preface Objectives

Read this preface to familiarize yourself with this manual and to learn how to use it properly and efficiently.

Important:

IMPORTANT You must use a series D or later adapter to communicate with FLEX Integra analog modules. You must use a series E or later adapter to communicate with 32 point FLEX modules.

Audience

We assume that you have previously used an Allen–Bradley programmable controller, that you are familiar with its features, and that you are familiar with the terminology we use. If not, read the user manual for your processor before reading this manual.

Vocabulary

In this manual, we refer to:

- the individual adapter module as the “adapter.”
- the programmable controller as the “controller” or the “processor.”
- input and output modules as the “module.”

What This Manual Contains

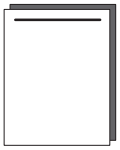
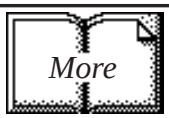
The contents of this manual are as follows:

Table P. A
What This Manual Contains

Chapter	Title	What’s Covered
1	Overview of FLEX I/O and the Remote I/O Adapter Module	Describes features, capabilities, and hardware components.
2	Installing Your Remote I/O Adapter	Procedures and guidelines for installing the module
3	Communicating with FLEX I/O Modules	Hardware addressing and configuration options
4	Troubleshooting	Troubleshooting aids
Appendix	**Title**	**What’s Covered**
A	Specifications	Module specifications
B	Differences Between Series A, B, C, D and E Remote I/O Adapters	
C	Safety Approvals	

Conventions

We use these conventions in this manual:

In this manual, we show:	Like this:
that there is more information about a topic in another chapter in this manual	
that there is more information about the topic in another manual	

For Additional Information

For additional information on FLEX I/O systems and modules, refer to the following documents:

Catalog Number	Voltage	Description	Publications	
			Installation Instructions	User Manual
1794		1794 FLEX I/O Product Data	1794-2.1	
1794-ACN	24V dc	ControlNet Adapter	1794-5.8	
1794-ACNR	24V dc	Redundant Media ControlNet Adapter	1794-5.18	
1794-ACN15	24V dc	ControlNet Adapter	1794-5.47	
1794-ACNR15	24V dc	Redundant Media ControlNet Adapter	1794-5.48	
1794-ADN	24V dc	DeviceNet Adapter	1794-5.14	1794-6.5.5
1794-ASB/E	24V dc	Remote I/O Adapter	1794-IN046	1794-UM009
1794-ASB2/D	24V dc	2-Slot Remote I/O Adapter	1794-IN044	1794-UM059
1794-APB	24V dc	Profibus Adapter	1794-IN040	1794-UM057
1794-IB8	24V dc	8 Sink Input Module	1794-5.30	
1794-OB8	24V dc	8 Source Output Module	1794-5.31	
1794-IB16	24V dc	16 Sink Input Module	1794-IN072	
1794-IB32	24V dc	16 Source Output Module	1794-IN084	
1794-OB16	24V dc	16 Source Output Module	1794-5.3	
1794-OB16P	24V dc	16 Source Output Module	1794-5.45	
1794-OB32P	24V dc	32 Electronically Fused Output Module	1794-IN090	
1794-IV16	24V dc	16 Source Input Module	1794-5.28	
1794-OV16	24V dc	16 Sink Output Module	1794-5.29	
1794-OB8EP	24V dc	8 Electronically Fused Output Module	1794-5.20	
1794-OV16P	24V dc	16 Electronically Fused Output Module	1794-5.52	
1794-IB8S	24V dc	Sensor Input Module	1794-5.7	
1794-IB10XOB6	24V dc	10 Input/6 Output Module	1794-5.24	
1794-IB16XOB16P	24V dc	16 Input/16 Output Module	1794-IN083	

Table continued on next page

Catalog Number	Voltage	Description	Publications	
			Installation Instructions	User Manual
1794-OW8	24V dc	8 Relay Output Module	1794-5.19	
1794-IE8	24V dc	Selectable Analog 8 Input Module	1794-5.6	1794-6.5.2
1794-OE4	24V dc	Selectable Analog 4 Output Module	1794-5.5	
1794-IE4XOE2	24V dc	4 Input/2 Output Analog Module	1794-5.15	
1794-OF4I	24V dc	4 Output Isolated Analog Module	1794-5.37	1794-6.5.8
1794-IF4I	24V dc	4 Input Isolated Analog Module	1794-5.38	
1794-IF2XOF2I	24V dc	2 Input/2 Output Isolated Analog Module	1794-5.39	
1794-IR8	24V dc	8 RTD Input Analog Module	1794-5.22	1794-6.5.4
1794-IT8	24V dc	8 Thermocouple Input Module	1794-5.21	1794-6.5.7
1794-IRT8	24V dc	8 Thermocouple/RTD Input Module	1794-5.50	1794-6.5.12
1794-IJ2	24V dc	2 Frequency Input Module	1794-5.49	1794-6.5.11
1794-ID2	24V dc	2 Channel Frequency Input Module	1794-5.63	1794-6.5.15
1794-IP4	24V dc	2 Channel Pulse Counter Module	1794-5.64	1794-6.5.16
1794-HSC	24V dc	High Speed Counter Module	1794-5.67	1794-6.5.10
1794-IC16	48V dc	48V dc 16 Input Module	1794-5.53	
1794-OC16	48V dc	48V dc Output Module	1794-5.54	
1794-IA8	120V ac	8 Input Module	1794-5.9	
1794-OA8	120V ac	8 Output Module	1794-5.10	
1794-IA8I	120V ac	Isolated 8 Input Module	1794-5.55	
1794-OA8I	120V ac	Isolated Output Module	1794-5.56	
1794-IA16	120V ac	16 Input Module	1794-5.60	
1794-OA16	120V ac	16 Output Module	1794-5.61	
1794-IM8	220V ac/dc	8 Input Module	1794-5.57	
1794-OM8	220V ac/dc	8 Output Module	1794-5.58	
1794-TB2 1794-TB3		2-wire Terminal Base 3-wire Terminal Base	1794-IN070	
1794-TBN		Terminal Base Unit	1794-IN016	
1794-TBNF		Fused Terminal Base Unit	1794-5.17	
1794-TB3T		Temperature Terminal Base Unit	1794-5.41	
1794-TB3S		Spring Clamp Terminal Base Unit	1794-5.42	
1794-TB3TS		Spring Clamp Temperature Base Unit	1794-5.43	
1794-TB3G		Terminal Base Unit	1794-5.51	
1794-TB3GS		Spring Clamp Terminal Base Unit	1794-5.59	
1794-TB32		Cage Clamp Terminal Base Unit	1794-IN085	
1794-TB32S		Spring Clamp Terminal Base Unit	1794-IN085	

Table continued on next page

Catalog Number	Voltage	Description	Publications	
			Installation Instructions	User Manual
1794-CE1, -CE3		Extender Cables	1794-5.12	
1794-NM1		Mounting Kit	1794-5.13	
1794-PS13	24V dc	Power Supply	1794-5.35	
1794-PS3	24V dc	Power Supply	1794-5.71	
FLEX Ex				
1797-IBN16	See note	16 NAMUR Digital Input Module	1794-IN072	
1797-OB4D	See note	4 NI, Ex Source Digital Output Module	1794-5.6	
1797-IE8	See note	8 Selectable Input Module	1794-5.5	
1797-IE8NF	See note	8 Selectable Filter Analog Input Module	1794-5.31	
1797-OE4	See note	Selectable Analog 4 Output Module	1794-5.3	
1797-IRT8	See note	8 Thermocouple/RTD Input Module	1794-5.4	
1797-IJ2	See note	2 Frequency Input Module	1794-5.9	
1797-TB3 1797-TB3S		3-wire Screw Clamp Terminal Base 3-wire Spring Clamp Terminal Base	1797-5.1 1797-5.2	
1797-BIC	See note	I.S. Bus Isolator	1797-5.13	
1797-CEC	See note	FLEX Ex Bus Connector	1797-5.13	

Note: Intrinsically Safe Voltage

ATTENTION

FLEX I/O is grounded through the DIN rail to chassis ground. Use zinc plated, yellow chromated steel DIN rail to assure proper grounding. Using other DIN rail materials (e.g. aluminum, plastic, etc.) which can corrode, oxidize or are poor conductors can result in improper or intermittent platform grounding.

ATTENTION

Preventing Electrostatic Discharge

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static–safe workstation.
- When not in use, keep modules in appropriate static–safe packaging.

WARNING

Remove field-side power before removing or inserting this module. This module is designed so you can **remove and insert it under backplane power**. When you remove or insert a module with field-side power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices causing unintended machine motion
- causing an explosion in a hazardous environment

Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance.

Summary

This preface gave you information on how to use this manual efficiently. The next chapter introduces you to the remote I/O adapter module.

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Safety Approvals **Appendix C**

Safety Approvals C–1

Overview of FLEX I/O and your Remote I/O Adapter Module

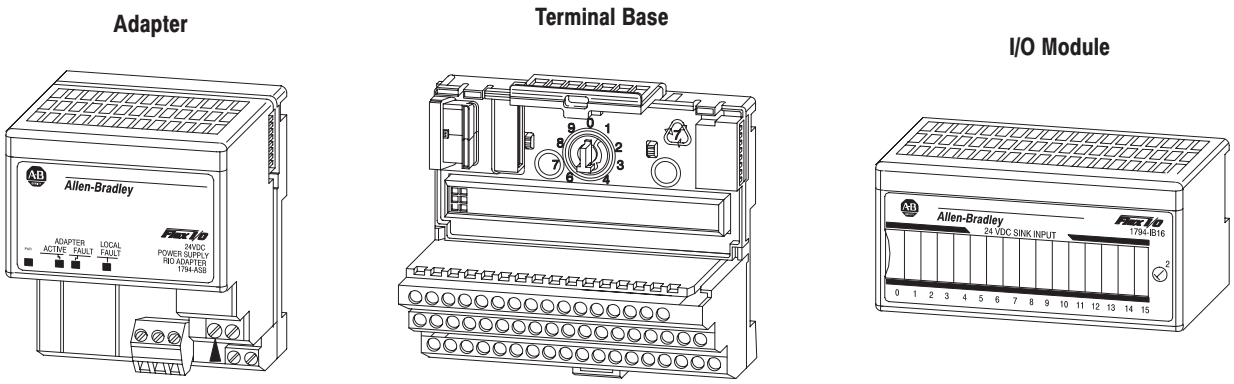
Chapter Objectives

In this chapter, we tell you about:

- what the FLEX I/O system is and what it contains
- how FLEX I/O modules communicate with programmable controllers
- the features of your adapter module

The FLEX I/O System

FLEX I/O is a small, modular I/O system for distributed applications that performs all of the functions of rack-based I/O. The FLEX I/O system contains the following components shown below:

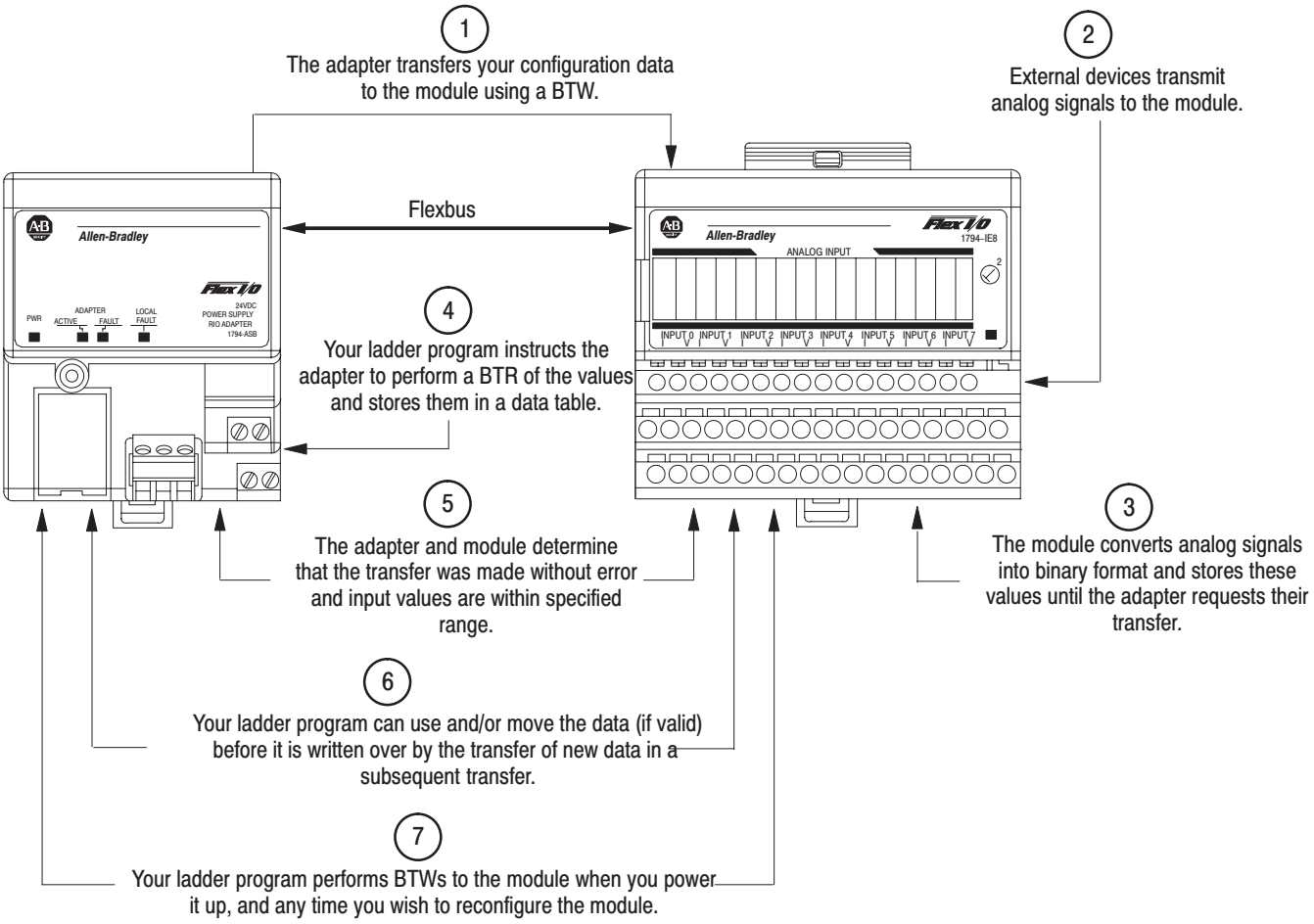


- adapter/power supply – powers the internal logic for as many as eight I/O modules
- terminal base – contains a terminal strip to terminate wiring for two- or three-wire devices
- I/O module – contains the bus interface and circuitry needed to perform specific functions related to your application

How FLEX I/O Modules Communicate with Programmable Controllers

Data transfer to and from the remote I/O adapter/power supply and discrete I/O modules occurs every flexbus scan. This provides the controller with updated data.

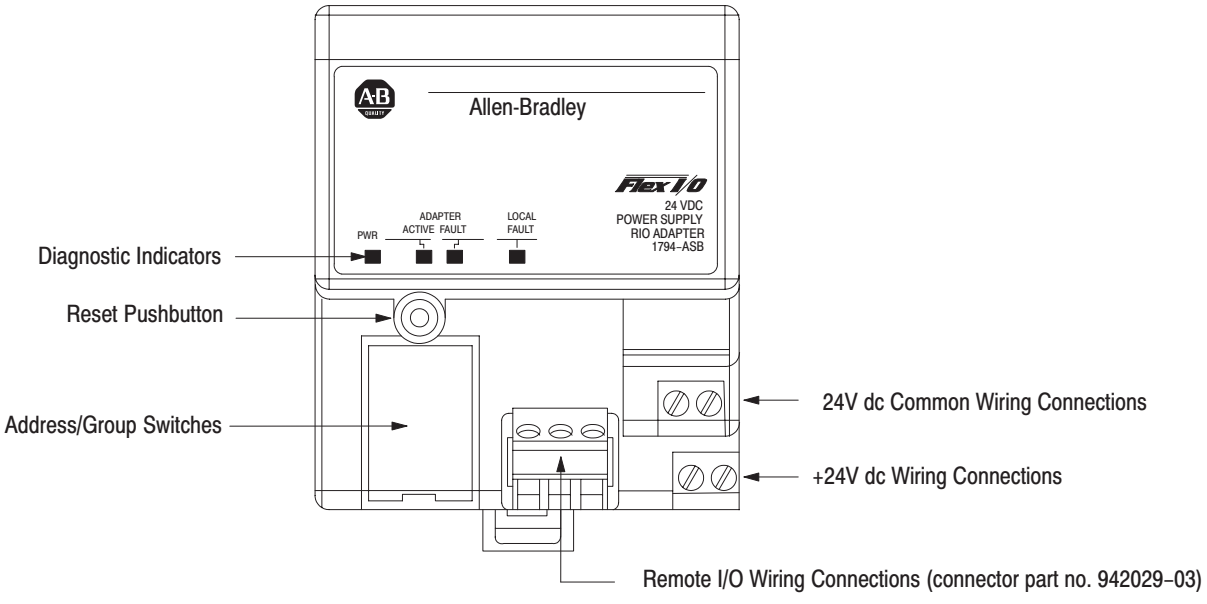
The remote I/O adapter/power supply transfers data to the analog I/O module (block transfer write) and from the analog I/O module (block transfer read) using BTW and BTR instructions in your ladder diagram program. These instructions let the adapter obtain input values and status from the I/O module, and let you send output values to establish the module's mode of operation. The communication process is described in the following illustration.


1
The adapter transfers your configuration data to the module using a BTW.
2
External devices transmit analog signals to the module.
Flexbus
Allen-Bradley
Flex I/O
PWR
ADAPTER ACTIVE
FAULT
LOCAL FAULT
24VDC POWER SUPPLY
RIO ADAPTER
1794-ASB
Allen-Bradley
Flex I/O
1794-IE8
ANALOG INPUT
INPUT 0 INPUT 1 INPUT 2 INPUT 3 INPUT 4 INPUT 5 INPUT 6 INPUT 7
4
Your ladder program instructs the adapter to perform a BTR of the values and stores them in a data table.
5
The adapter and module determine that the transfer was made without error and input values are within specified range.
3
The module converts analog signals into binary format and stores these values until the adapter requests their transfer.
6
Your ladder program can use and/or move the data (if valid) before it is written over by the transfer of new data in a subsequent transfer.
7
Your ladder program performs BTWs to the module when you power it up, and any time you wish to reconfigure the module.

Hardware Components

The adapter module consists of the following major components:

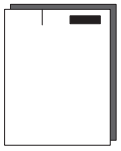
- diagnostic indicators
- reset pushbutton
- remote I/O wiring connections
- 24V dc power wiring connections
- address/group switch assemblies



Diagnostic Indicators

Diagnostic indicators are located on the front panel of the adapter module. They show both normal operation and error conditions in your remote I/O system. The indicators are:

- Power ON (green)
- Adapter ACTIVE (green)
- Adapter FAULT (red)
- LOCAL FAULT (red)

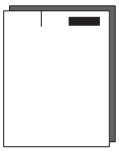


A complete description of the diagnostic indicators and how to use them for troubleshooting is explained in chapter 4.

Reset Pushbutton

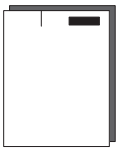
Use the reset pushbutton to reset the adapter module and resume communication when a communication error occurs. (The adapter's processor restart lockout switch (PRL) must be in the "locked out" position.) If the adapter is not locked out by the PRL switch, it will be automatically reset via special commands sent over the communication link.

Important: Do not cycle power to the adapter to clear a fault. All queued block transfer instructions will be lost.



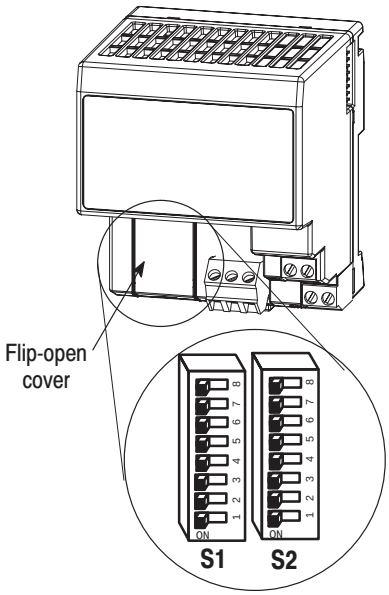
Remote I/O Wiring

The remote I/O wiring termination is made to a plug-in connector on the front of the adapter module. Refer to Chapter 2 for information on wiring the connector.



Power Wiring

Connections are provided for connecting the required 24V dc power to the front of the module. The power wiring can be daisy-chained to the terminal base unit located next to the adapter to supply power to the module installed in that base unit. Wiring information is shown in Chapter 2.



Address Switch Assemblies

Multi-position switches are provided for:

- starting I/O group
- I/O rack number
- hold inputs
- mode switches for mode 0, mode 1, mode 2, mode 3 and mode 4
- rack fault
- communication rate
- processor restart lockout (PRL)
- hold last state (outputs)

These switches are accessed by lifting the hinged cover on the front of the module. Refer to Chapter 2 for switch settings.

Chapter Summary

In this chapter you learned about the FLEX I/O system and features of the remote I/O adapter module.

Installing Your Remote I/O Adapter Module

Chapter Objectives

This chapter describes the procedures for installing your remote I/O adapter module. These include:

- power requirements
- mounting the remote I/O adapter
- setting the module switches

ATTENTION

Environment and Enclosure

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664–1), at altitudes up to 2000 meters without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

This equipment is supplied as “open type” equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present, and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

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- If available, use a static–safe workstation.
- When not in use, keep modules in appropriate static–safe packaging.

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Remove field-side power before removing or inserting this module. This module is designed so you can **remove and insert it under backplane power**. When you remove or insert a module with field-side power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices causing unintended machine motion
- causing an explosion in a hazardous environment

Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance.

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FLEX I/O is grounded through the DIN rail to chassis ground. Use zinc plated, yellow chromated steel DIN rail to assure proper grounding. Using other DIN rail materials (e.g. aluminum, plastic, etc.) which can corrode, oxidize or are poor conductors can result in improper or intermittent platform grounding.

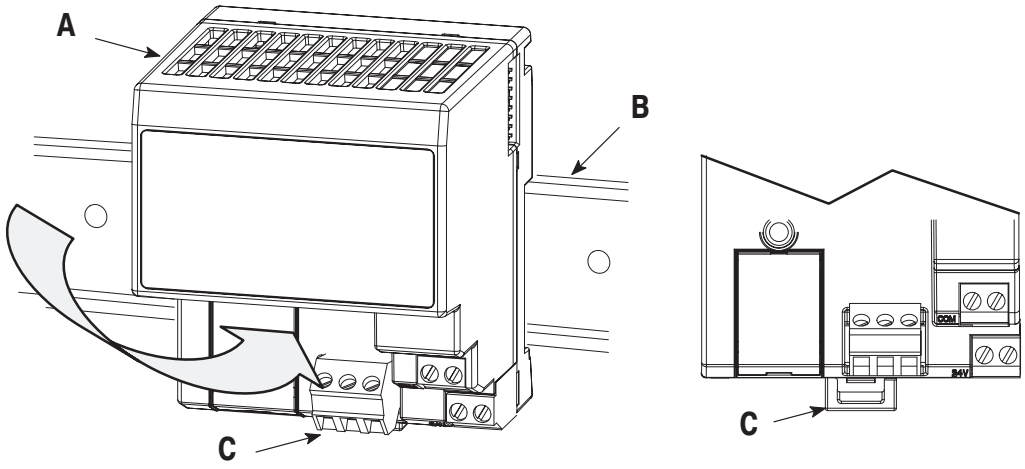
Power Requirements

The Remote I/O adapter module requires a current of 450mA at 24V dc from an external power supply for flexbus operation. This is sufficient to support the flexbus current requirements of 8 modules. Remember to add this amount to current requirements for other modules using the same 24V supply.

Mounting the Remote I/O Adapter

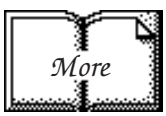
The remote I/O adapter module can be DIN rail or wall/panel mounted. Refer to the specific method of mounting below.

Mounting on a DIN Rail before installing the terminal base units



1. Position the remote I/O adapter module **A** on a 35 x 7.5mm DIN rail **B** (A-B pt. no. 199-DR1; 46277-3; EN 50022) at a slight angle.
2. Rotate the adapter module onto the DIN rail with the top of the rail hooked under the lip on the rear of the adapter module.
3. Press the adapter module down onto the DIN rail until flush. Locking tab **(C)** will snap into position and lock the adapter module to the DIN rail.

   If the adapter module does not lock in place, use a screwdriver or similar device to move the locking tab down while pressing the adapter module flush onto the DIN rail and release the locking tab to lock the adapter module in place. If necessary, push up on the locking tab to lock.
4. Connect the adapter wiring as shown under “Wiring” later in this document.



IMPORTANT Make certain that the DIN rail is properly grounded to the panel. Refer to “Industrial Automation Wiring and Grounding Guidelines,” publication 1770-4.1.

Mounting (or Replacing) the Adapter on an Existing System

ATTENTION

If you connect or disconnect wiring while the field side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

1. Remove the RIO plug-in connector from the front of the adapter.
2. Disconnect any wiring connected to the adjacent terminal base.
3. Using a screwdriver or similar tool, open the lock and remove the module from the base unit to which the adapter will be attached.
4. Push the flexbus connector toward the right side of the terminal base to unplug the backplane connection.

ATTENTION

Make certain that the flexbus connector is completely clear of the adapter. The slide must be completely to the right and the raised spot on the slide visible.

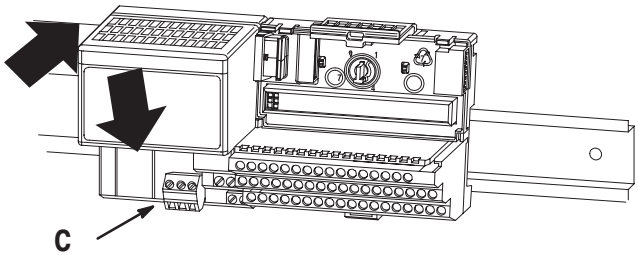
5. Release the locking tab and remove the adapter.
6. Before installing the new adapter, notice the notch on the right rear of the adapter. This notch accepts the hook on the terminal base unit. The notch is open at the bottom. The hook and adjacent connection point keep the terminal base and adapter tight together, reducing the possibility of a break in communication over the backplane.

ATTENTION

Make certain that the hook on the terminal base is properly hooked into the adapter. Failure to lock the hook into the adjacent base/adapter can result in loss of communication on the backplane.

7. Place the adapter next to the terminal base unit and push down to mate the hook into slot.

8. With the hook on the terminal base inside the notch on the adapter, and the lip on the rear of the adapter hooked over the DIN rail, press in and down to lock the adapter onto the DIN rail.



If the adapter module does not lock in place, use a screwdriver or similar device to move the locking tab down while pressing the adapter module flush onto the DIN rail and release the locking tab **(C)** to lock the adapter module in place. If necessary, push up on the locking tab to lock.

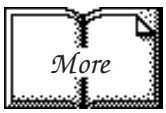
9. **Gently** push the flexbus connector into the side of the adapter to complete the backplane connection.
10. Reinstall the module into the terminal base unit.
11. Reconnect the adapter wiring as shown under "Wiring."

Mounting on a Wall or Panel

To mount the remote I/O adapter module on a wall or panel, you must have the 1794-NM1 mounting kit. The kit contains a special plate and screws necessary for wall/panel mounting. Proceed as follows:

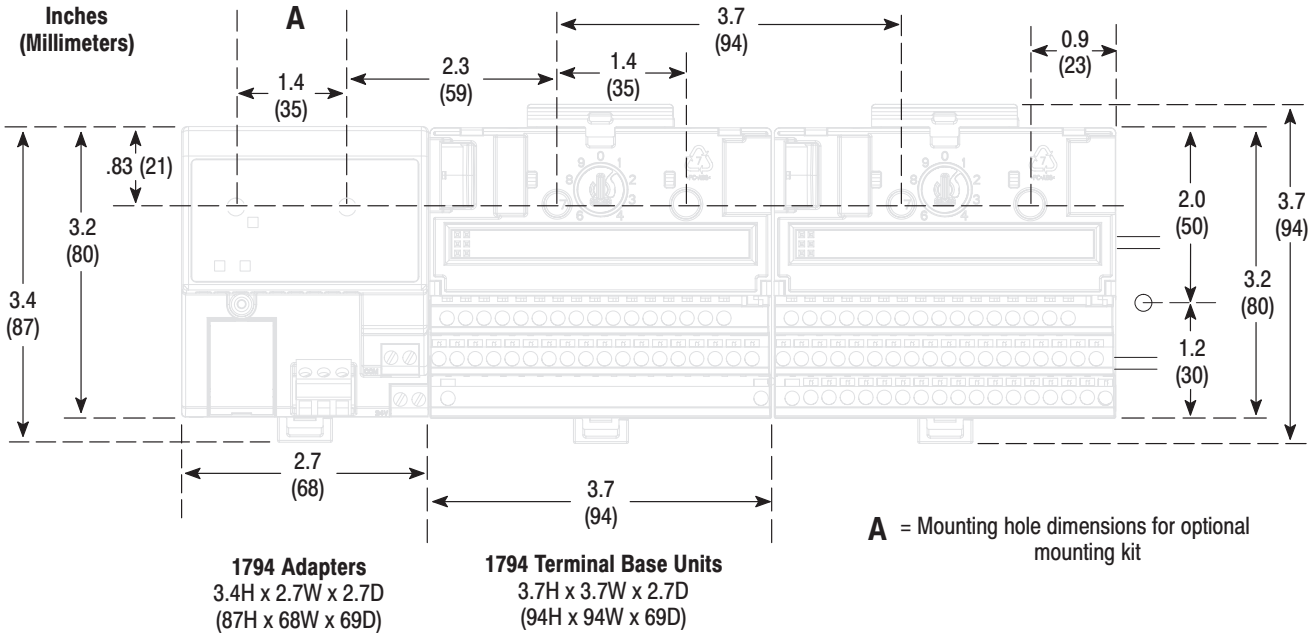
Install the mounting plate on a wall or panel as follows:

1. Lay out the required points on the wall/panel as shown in the drilling dimension drawing.
2. Drill the necessary holes for #6 self-tapping mounting screws.
3. Mount the mounting plate (1) for the adapter module using two #6 self-tapping screws (18 included).



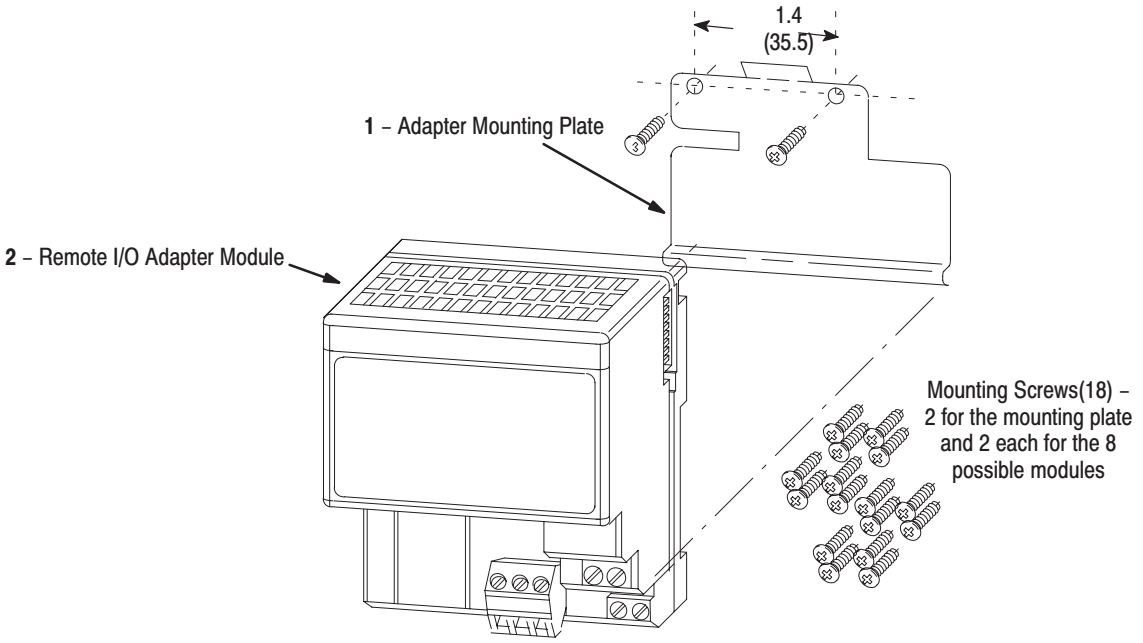
IMPORTANT Make certain that the mounting plate is properly grounded to the panel. Refer to "Industrial Automation Wiring and Grounding Guidelines for Noise Immunity," publication 1770-4.1.

4. Hold the adapter (2) a slight angle and engage the top of the mounting plate in the indention on the rear of the adapter module.
5. Press the module down flush with the panel until the locking lever locks.



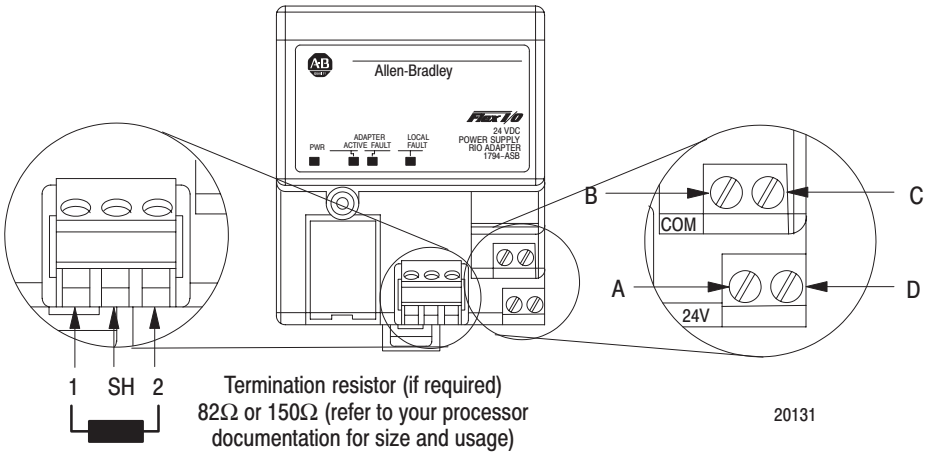
6. Position the termination base unit up against the adapter and push the female bus connector into the adapter.
7. Secure to the wall with two #6 self-tapping screws.
8. Repeat for each remaining terminal base unit.

Note: The adapter is capable of addressing eight modules. Do not exceed a maximum of eight terminal base units in your system.


1.4
(35.5)
1 – Adapter Mounting Plate
2 – Remote I/O Adapter Module
Mounting Screws(18) – 2 for the mounting plate and 2 each for the 8 possible modules

Wiring

Connect external wiring to the remote I/O adapter as shown below.



1. Connect the remote I/O cable to the removable plug-in remote I/O connector.

Connect	To
Blue Wire – RIO	1
Shield Wire – RIO	SH
Clear Wire – RIO	2

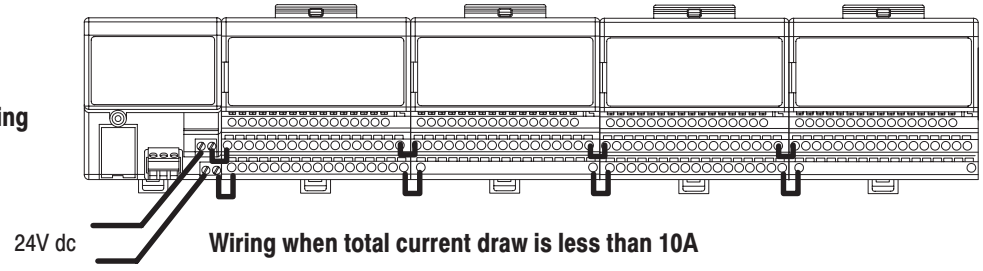
ATTENTION

If this is the last adapter in your FLEX I/O system, or the last adapter on the remote I/O link, you must use a termination resistor across terminals 1 and 2 on the remote I/O connector. Refer to the information supplied with the processor being used for information on the size of the resistor.

2. Connect +24V dc input to the left side of the lower connector terminal **A**.
3. Connect 24V common to the left side of the upper connector terminal **B**.
4. Connections **C** and **D** are used to pass 24V dc power and common to the next module in the series (if required).

For Example:

Daisy-chaining



Wiring when total current draw is less than 10A

Note: Modules must be either all analog or all discrete. Do not mix analog and discrete modules when using the daisy-chain wiring scheme.

Note: Refer to the individual instructions for each module for actual wiring information.

Setting the Switches

The remote I/O adapter module has two 8-position switch assemblies which you set for:

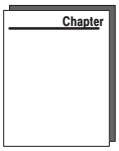
- starting I/O group
- I/O logical rack number
- hold inputs
- addressing modes
- last chassis
- communication rate
- processor restart lockout (PRL)
- hold last state (outputs)

WARNING

The switch settings on the series E adapter are not the same as on the series A, B, C or D adapter. If you are replacing an earlier series adapter with this series E adapter, make certain that the switches are set correctly for your application.

Starting I/O Group

An I/O group is an addressing unit that can contain up to 16 input terminals and 16 output terminals. The **starting I/O group** is the first group of input and output circuits that correspond to one word in both the input and output image tables. These starting I/O groups are numbered 0, 2, 4 and 6. The number of modules that make up an I/O group varies with the mode of addressing.



I/O Rack Number

One logical I/O rack is 8 I/O groups. You cannot have more than 2 logical racks per adapter. Refer to “Determining Rack Size” on page 3–15 for examples.

Hold Inputs

When hold inputs is enabled (S2-7 on), the adapter will retain the last memory image present when you remove a discrete input module from its base. These inputs are held until the correct module is placed back in the base. If the same type of module is reinserted into the base, its inputs will be transferred. If a different type of module is inserted in the base, its memory image will go to zero. Any associated outputs will also go to zero.

Rack Fault Select Switch (RFS)

The rack fault select allows the user to determine what action the adapter takes if communication is lost with one or more I/O modules

ATTENTION

If an I/O module stops responding to the adapter due to a module being removed under power, a problem with the flexbus, or a problem with an I/O module, the adapter declares a Local fault.

When RFS is disabled (S2–6 on), module removal and insertion under power (RIUP) is possible. If an I/O module stops responding, the adapter declares a local fault and flashes the Local Fault indicator. The adapter also resets the output data (if any) for the module not responding. All other modules remain active.

When the RFS is enabled (S2-6 off), communication error detection is extended to the I/O module level. If an I/O module stops responding, the adapter declares a local fault, flashes the Local Fault indicator and causes the scanner to declare a Rack Fault. The adapter resets the output data (if any) for the module not responding and commands all other outputs to go to the state determined by the Hold Last State switch (S2–1).

ATTENTION

Module removal and insertion under power (RIUP) will cause a rack fault when Rack Fault Select is enabled.

Addressing Mode Selection Switches

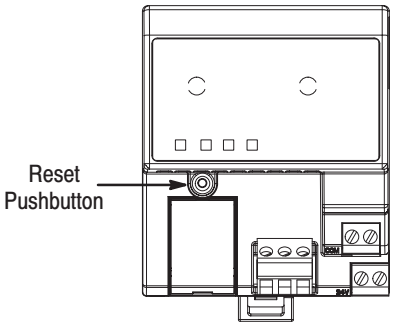
The addressing mode switches are used to select the addressing modes of the adapter: standard, 8-pt compact, 16-pt compact, 8-pt complementary, 16-pt complementary, 32 standard, and 32 complimentary. Refer to the table on page2–12 for information on the interaction of these switches.

Mode switch S1-1 provides different functions. In standard mode, it acts as part of the rack address, providing backward compatibility with the series A or B adapters. In compact mode, it determines 8 or 16-point density. In complementary mode, it specifies whether the rack has a complementary rack at the same address.

Communication Rate

You set these switches (S2-3 and S2-4) for the desired communication rate (in bits/s). Selections are:
57.6k bits/s
115.2k bits/s
230.4k bits/s
Autobaud (used in 32-pt modes)

Processor Restart Lockout (PRL)



When PRL is disabled (switch S2-2 on), the programmable controller can restart communication with the adapter in the event of a communication fault.

When PRL is enabled (switch S2-2 off), the programmable controller cannot restart communication with the adapter in the event of a communication fault. In this case, you must press the restart pushbutton on the front of the adapter module to restart communication.

Hold Last State (HLS)

The hold last state option allows the user to determine what action the outputs take in the event of a communication error.

When HLS is enabled (S2–1 off), all digital outputs, and 1794-OE4 and 1794-IE4XOE2 analog modules remain in their last state. All other analog outputs take their configured safe state action

When HLS is disabled (S2–1 on), all digital outputs are reset. All analog outputs take their configured safe state action

ATTENTION

Only 1794-OE4 and 1794-IE4XOE2 analog modules hold their last state when Hold Last State is enabled. Refer to the respective module publications for information about configuring analog output safe state actions.

The switch assemblies are located under a flip-open cover on the front of the adapter module.

Starting I/O Group[1]		
S1–8	**S1–7**	**I/O group**
ON	ON	0 (1st quarter)
OFF	ON	2 (2nd quarter)
ON	OFF	4 (3rd quarter)
OFF	OFF	6 (4th quarter)

1 In 32 point mode, starting quarter should always be 0 (S1–8 and S1–7 on).

I/O Rack Number
S1–6 thru S1–1
Refer to page 2–13

S2–8	Mode Switch 0
Refer to Mode Selection Switches, 2–12	

S2–7	Hold Inputs
ON	Hold Inputs
OFF	Reset Inputs

S2–6	Rack Fault
ON	Not Enabled (default)
OFF	Enabled

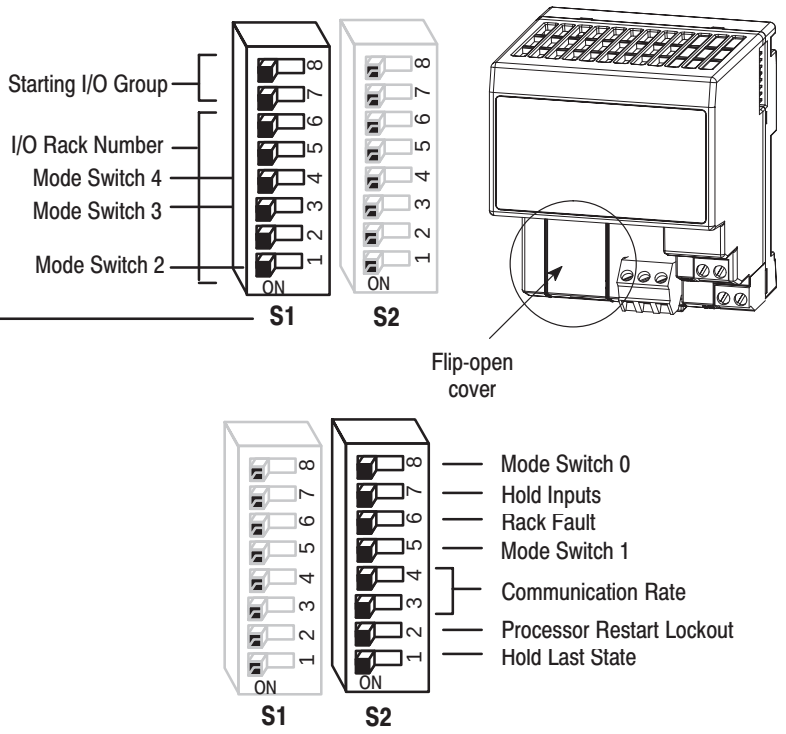
S2–5	Mode Switch 1
Refer to Mode Selection Switches, 2–12	

Communication Rate		
S2–4	**S2–3**	**Bits/s**
ON	ON	57.6k
OFF	ON	115.2k
ON	OFF	230.4k
OFF	OFF	Autobaud (used only with 32-pt mode[1])

[1] Cycle power to the 1794-ASB/E or push the reset button when baud rate is changed in the scanner.

Processor Restart Lockout (PRL)	
S2–2	**Processor:**
ON	Restart
OFF	Locked out

Hold Last State (HLS)	
S2–1	**Processor will:**
ON	Reset outputs
OFF	Hold last state



Setting the Mode Selection Switches

Set the mode selection switches for the desired mode as follows.

1. Lift the hinged switch cover on the front of the adapter to expose the switches.
2. Set the switches as shown below.
3. Cycle power to the adapter to activate the settings.

When Using this Addressing Mode	And	Mode Switch 2 S1-1	Mode Switch 1 S2-5	Mode Switch 0 S2-8
Standard	8 and/or 16- point modules	See note 1	ON	ON
Compact	8-point modules	OFF	ON	OFF
	16-point modules	ON	ON	OFF
Complementary	See Complementary Rack Addressing Table, page2–15			
Primary chassis	8-point modules	OFF	OFF	ON
Complementary chassis		ON	OFF	ON
Complementary	See Complementary Rack Addressing Table, page2–15			
Primary chassis	16-point modules[2]	OFF	OFF	OFF
Complementary chassis		ON	OFF	OFF

[1] In standard mode, this switch retains its function as switch position 1 of rack addressing. In Standard mode, the module acts like a 1794-ASB/B module.
[2] When programming block transfers, address analog modules as module 0 if switch S1-1 is on; module 1 if switch S1-1 is off.

When Using this Addressing Mode	And	Mode Switch 0 S2–8	Mode Switch 1 S2-5	Mode Switch 2 S1–1	Mode Switch 3 S1–3	Mode Switch 4 S1-4
Standard – 32[1]	8, 16 and/or 32-point modules	ON	ON	See note 3	OFF	OFF
Complementary – 32 Primary chassis[2]	8, 16 and/or 32-point modules	OFF	OFF	OFF	OFF	OFF
Complementary – 32 Complementary chassis[2]		OFF	OFF	ON	OFF	OFF

[1] In Standard – 32 mode, any module in the chassis occupies 32 input points and 32 output points in the Input/Output data table.
[2] In Complementary – 32 mode, any module in the chassis occupies 32 input points **or** 32 output points in the Input/Output data table. If using an 8 point or 16 point module, the unused points in the data table are zeroed out.
[3] In standard mode, this switch retains its function as switch position 1 of rack addressing. In Standard mode, the module acts like a 1794-ASB/B module.

Setting the Address Switches

Use the following table to set your address switches.

Rack Number				S1 Switch Position					
1747-SN	PLC-5	PLC-5/250	PLC-3	6	5	4	3	2	1
Rack 0	Not Valid	Rack 0	Rack 0	ON	ON	ON	ON	ON	ON
Rack 1	Rack 1	Rack 1	Rack 1	OFF	ON	ON	ON	ON	ON
Rack 2	Rack 2	Rack 2	Rack 2	ON	OFF	ON	ON	ON	ON
Rack 3	Rack 3	Rack 3	Rack 3	OFF	OFF	ON	ON	ON	ON
	Rack 4	Rack 4	Rack 4	ON	ON	OFF	ON	ON	ON
	Rack 5	Rack 5	Rack 5	OFF	ON	OFF	ON	ON	ON
	Rack 6	Rack 6	Rack 6	ON	OFF	OFF	ON	ON	ON
	Rack 7	Rack 7	Rack 7	OFF	OFF	OFF	ON	ON	ON
	Rack 10	Rack 10	Rack 10	ON	ON	ON	OFF	ON	ON
	Rack 11	Rack 11	Rack 11	OFF	ON	ON	OFF	ON	ON
	Rack 12	Rack 12	Rack 12	ON	OFF	ON	OFF	ON	ON
	Rack 13	Rack 13	Rack 13	OFF	OFF	ON	OFF	ON	ON
	Rack 14	Rack 14	Rack 14	ON	ON	OFF	OFF	ON	ON
	Rack 15	Rack 15	Rack 15	OFF	ON	OFF	OFF	ON	ON
	Rack 16	Rack 16	Rack 16	ON	OFF	OFF	OFF	ON	ON
	Rack 17	Rack 17	Rack 17	OFF	OFF	OFF	OFF	ON	ON
	Rack 20	Rack 20	Rack 20	ON	ON	ON	ON	OFF	ON
	Rack 21	Rack 21	Rack 21	OFF	ON	ON	ON	OFF	ON
	Rack 22	Rack 22	Rack 22	ON	OFF	ON	ON	OFF	ON
	Rack 23	Rack 23	Rack 23	OFF	OFF	ON	ON	OFF	ON
	Rack 24	Rack 24	Rack 24	ON	ON	OFF	ON	OFF	ON
	Rack 25	Rack 25	Rack 25	OFF	ON	OFF	ON	OFF	ON
	Rack 26	Rack 26	Rack 26	ON	OFF	OFF	ON	OFF	ON
	Rack 27	Rack 27	Rack 27	OFF	OFF	OFF	ON	OFF	ON
		Rack 30	Rack 30	ON	ON	ON	OFF	OFF	ON
		Rack 31	Rack 31	OFF	ON	ON	OFF	OFF	ON
		Rack 32	Rack 32	ON	OFF	ON	OFF	OFF	ON
		Rack 33	Rack 33	OFF	OFF	ON	OFF	OFF	ON
		Rack 34	Rack 34	ON	ON	OFF	OFF	OFF	ON
		Rack 35	Rack 35	OFF	ON	OFF	OFF	OFF	ON
		Rack 36	Rack 36	ON	OFF	OFF	OFF	OFF	ON
		Rack 37	Rack 37	OFF	OFF	OFF	OFF	OFF	ON
See note 1 – Rack addresses 40 thru 76 are only available in standard and standard–32 modes.			Rack 40	ON	ON	ON	ON	ON	OFF
			Rack 41	OFF	ON	ON	ON	ON	OFF

Continued on next page

Rack Number				S1 Switch Position					
1747-SN	PLC-5	PLC-5/250	PLC-3	6	5	4	3	2	1
			Rack 42	ON	OFF	ON	ON	ON	OFF
			Rack 43	OFF	OFF	ON	ON	ON	OFF
			Rack 44	ON	ON	OFF	ON	ON	OFF
			Rack 45	OFF	ON	OFF	ON	ON	OFF
			Rack 46	ON	OFF	OFF	ON	ON	OFF
			Rack 47	OFF	OFF	OFF	ON	ON	OFF
			Rack 50	ON	ON	ON	OFF	ON	OFF
			Rack 51	OFF	ON	ON	OFF	ON	OFF
			Rack 52	ON	OFF	ON	OFF	ON	OFF
			Rack 53	OFF	OFF	ON	OFF	ON	OFF
			Rack 54	ON	ON	OFF	OFF	ON	OFF
			Rack 55	OFF	ON	OFF	OFF	ON	OFF
			Rack 56	ON	OFF	OFF	OFF	ON	OFF
			Rack 57	OFF	OFF	OFF	OFF	ON	OFF
			Rack 60	ON	ON	ON	ON	OFF	OFF
			Rack 61	OFF	ON	ON	ON	OFF	OFF
			Rack 62	ON	OFF	ON	ON	OFF	OFF
			Rack 63	OFF	OFF	ON	ON	OFF	OFF
			Rack 64	ON	ON	OFF	ON	OFF	OFF
			Rack 65	OFF	ON	OFF	ON	OFF	OFF
			Rack 66	ON	OFF	OFF	ON	OFF	OFF
			Rack 67	OFF	OFF	OFF	ON	OFF	OFF
			Rack 70	ON	ON	ON	OFF	OFF	OFF
			Rack 71	OFF	ON	ON	OFF	OFF	OFF
			Rack 72	ON	OFF	ON	OFF	OFF	OFF
			Rack 73	OFF	OFF	ON	OFF	OFF	OFF
			Rack 74	ON	ON	OFF	OFF	OFF	OFF
			Rack 75	OFF	ON	OFF	OFF	OFF	OFF
			Rack 76	ON	OFF	OFF	OFF	OFF	OFF
			Not Valid	OFF	OFF	OFF	OFF	OFF	OFF

Rack address 77 is an illegal configuration.
PLC-5/11 processors can scan rack 03.
PLC-5/15 and PLC-5/20 processors can scan racks 01–03.
PLC-5/25 and PLC-5/30 processors can scan racks 01–07.
PLC-5/40 and PLC-5/40L processors can scan racks 01–17.
PLC-5/60 and PLC-5/60L processors can scan racks 01–27.
PLC-5/250 processors can scan racks 00–37.
PLC-3 processors can scan racks 00–76.
Note 1 – When using a 1794-ASB series C (or later) adapter module, rack addresses 40 to 76 are only available in Standard and Standard–32 modes.

Setting the Address Switches for Complementary I/O

Use the following table to set your address switches for complementary I/O when using a PLC-5 processor. For all other processors, refer to the programming manual for that specific processor.

Primary Rack

Rack Number		S1 Switch Position					
1747-SN	PLC-5	6	5	4	3	2	1
Rack 0	Not Valid	ON	ON	ON	ON	ON	OFF
Rack 1	Rack 1	OFF	ON	ON	ON	ON	OFF
Rack 2	Rack 2	ON	OFF	ON	ON	ON	OFF
Rack 3	Rack 3	OFF	OFF	ON	ON	ON	OFF
	Rack 4	ON	ON	OFF	ON	ON	OFF
	Rack 5	OFF	ON	OFF	ON	ON	OFF
	Rack 6	ON	OFF	OFF	ON	ON	OFF
	Rack 7	OFF	OFF	OFF	ON	ON	OFF

Complementary Rack

Rack Number		S1 Switch Position					
1747-SN	PLC-5	6	5	4	3	2	1
Rack 0	Not Valid	ON	ON	ON	OFF	ON	ON
Rack 1	Rack 1	OFF	ON	ON	OFF	ON	ON
Rack 2	Rack 2	ON	OFF	ON	OFF	ON	ON
Rack 3	Rack 3	OFF	OFF	ON	OFF	ON	ON
	Rack 4	ON	ON	OFF	OFF	ON	ON
	Rack 5	OFF	ON	OFF	OFF	ON	ON
	Rack 6	ON	OFF	OFF	OFF	ON	ON
	Rack 7	OFF	OFF	OFF	OFF	ON	ON

Chapter Summary

In this chapter you learned how to install your adapter module and set your switches. Chapter 3 tells you how to communicate with your system.

Communicating with FLEX I/O Modules

Chapter Objectives

In this chapter, we tell you about:

- FLEX I/O module data
- selecting an addressing type
- selecting an addressing mode
- determining rack size
- mapping data into the image tables
- operating modes

FLEX I/O Module Data

There are 2 types of data associated with FLEX I/O modules: input data and output data.

- input data – data read from the module by the processor
- output data – data written to the module by the processor

Some digital I/O modules have both input and output data associated with them. Digital I/O modules map input data and output data to the input and output image tables in the processor. Input and output data can be defined as:

- real I/O data – data that represents the actual state of hardwired inputs and outputs (input data on input modules, output data on output modules)
- configuration/status data – data written to configure the module (such as delay times); and status information (such as a fuse blown indication)

For FLEX analog modules, input and output data is only accessible by the processor using block transfer instructions. The data is contained in block transfer write (BTW) and block transfer read (BTR) data files, **not** in the input and output image tables. A byte of input image and a byte of output image **is** required for the module status byte (MSB) and the module control byte (MCB). The MSB uses input image, and the MCB uses output image. These bytes are required for block transfer command communications.

Addressing I/O

The 1794-ASB series E adapter supports 5 different modes of addressing: standard, compact, complementary, standard–32 and complementary–32.

For digital modules, the type of addressing determines what type of data is available to the processor from the module.

- standard addressing – input **and** output data is available for each digital module connected to the adapter
- compact addressing – either input **or** output data (not both) is available for each digital module connected to the adapter
- complementary addressing – either input **or** output data (not both) is available for each digital module connected to the adapter

Analog modules can be used in any type of addressing with no loss of data because data is not stored in the input and output image table. Analog data is stored in BTW and BTR data files.

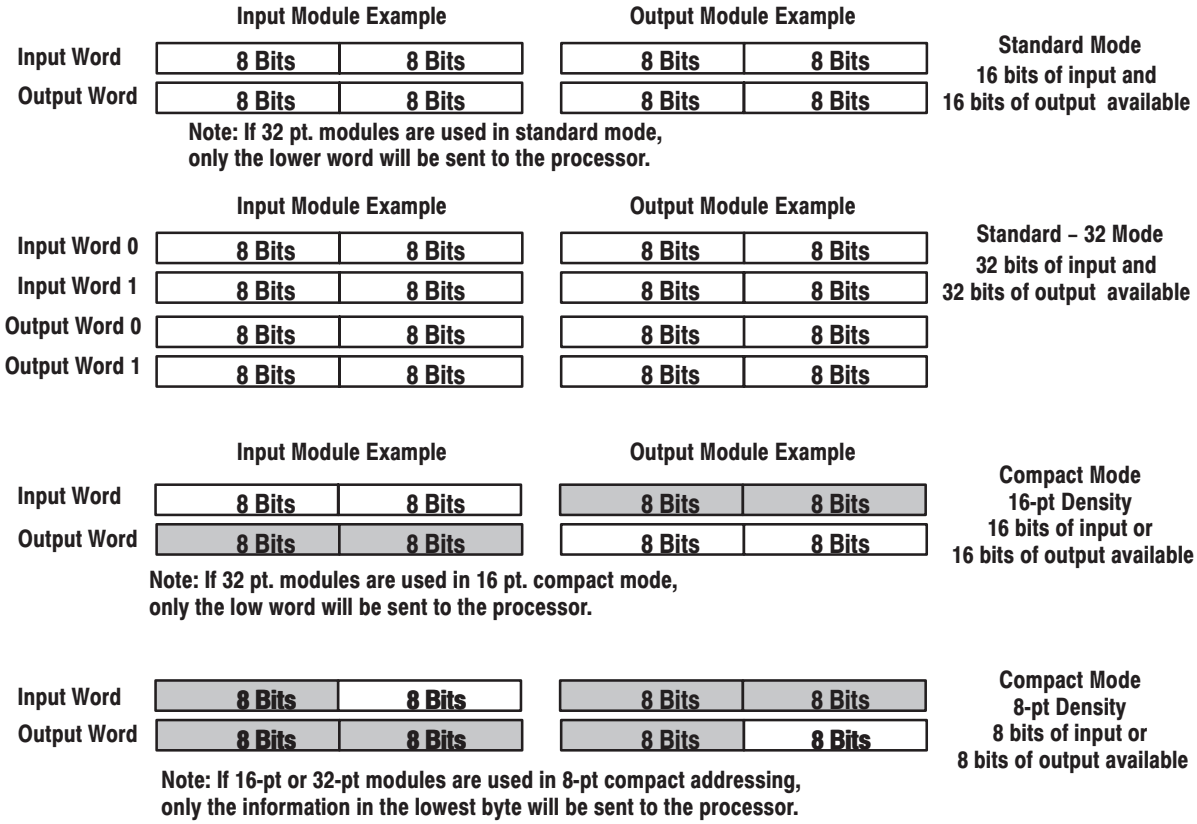
The following table helps you to select an addressing type based on the kind of modules you want to use, and the features you need from those modules. The table also lists both advantages and disadvantages of using each addressing type.

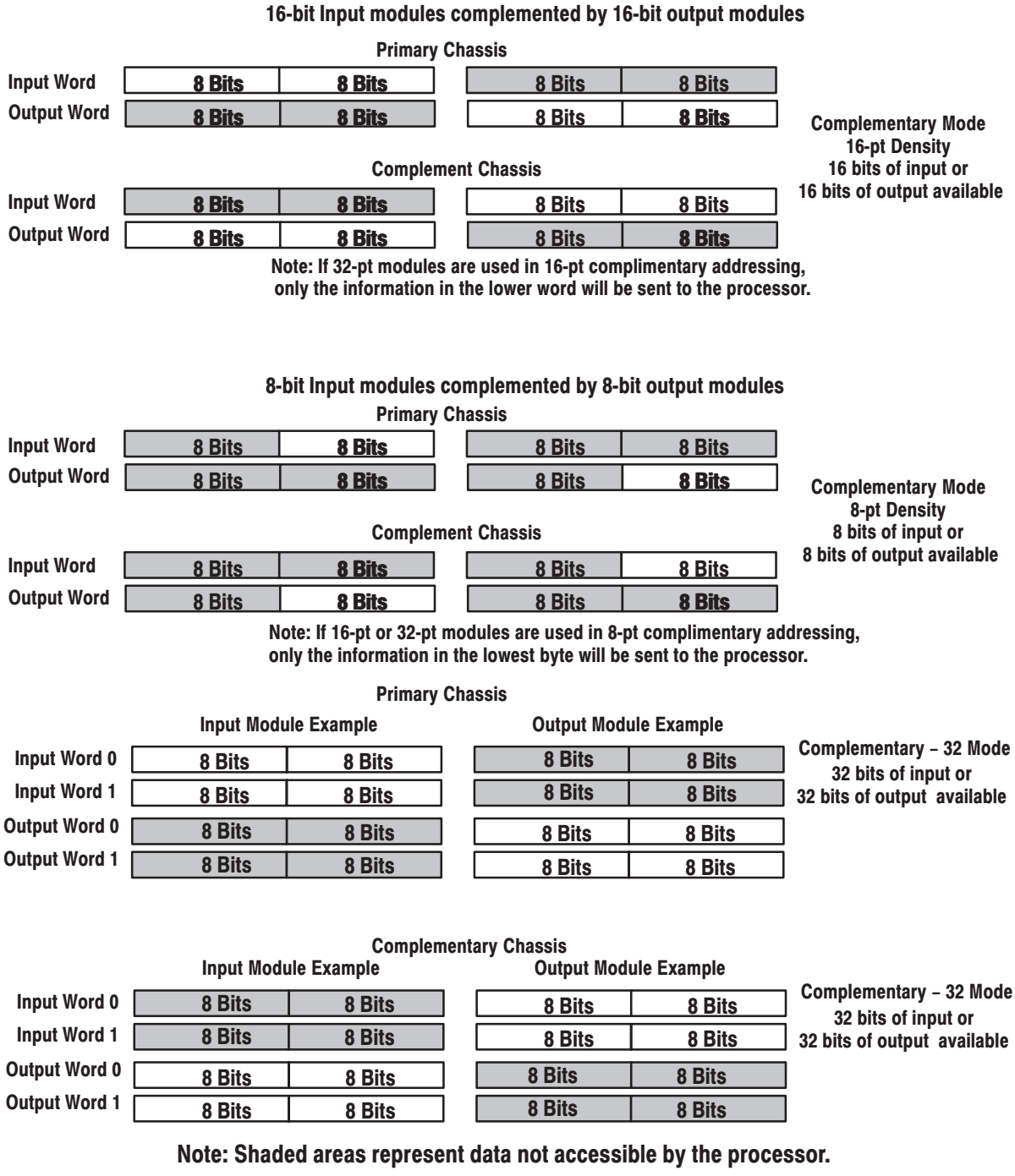
Addressing Mode	Use this addressing scheme when:	Advantages	Disadvantages
Standard	• you need full FLEX I/O module functionality, including combination modules (1794-IB10XOB6), settable input delay times on input modules (1794-IB16, -IB8S), and fuse blown indication (1794-OB8EP) for example.	• User has access to 1 word of input, 1 word of output for each digital module. • Eight modules equal 1 logical rack. • No restrictions on module placement • Maximum use of configuration/status and combination modules	• Inefficient I/O image table utilization
Compact	• you **don't** need full FLEX I/O module functionality, including combination modules (1794-IB10XOB6), settable input delay times on input modules (1794-IB16, -IB8S), and fuse blown indication (1794-OB8EP), for example. • you can locate equal numbers of input and output modules in a single chassis	• Eight 8 point modules equal 1/4 logical rack • Eight 16 point modules equal 1/2 logical rack • Provides maximum use of I/O image table by a single FLEX chassis (when input and output modules are installed in alternate slots).	• You must configure all modules in the chassis as either 8-point or-16 point. • No combination modules allowed • Configuration/status data is not accessible to user
Complementary	• you **don't** need full FLEX I/O module functionality, including combination modules (1794-IB10XOB6), settable input delay times on input modules (1794-IB16, -IB8S), and fuse blown indication (1794-OB8EP), for example. • you can locate equal numbers of input and output modules in separate chassis	• Eight 8 point modules in each chassis equal 1/2 logical rack • Eight 16 point modules in each chassis equal 1 logical rack • Provides maximum use of I/O image table in 2 FLEX chassis (when input modules are installed in 1 chassis, and output modules are installed in the complementary chassis).	• You must configure all modules in both chassis as either 8-point or 16-point. • No combination modules allowed • Configuration/status data is not accessible to user

Standard – 32	• you need full FLEX I/O module functionality, including 32 point modules, combination modules (1794-IB10XOB6), settable input delay times on input modules (1794-IB16, -IB8S), and fuse blown indication (1794-OB8EP) for example.	• User has access to 2 words of input, 2 words of output for each digital module. • Four modules equal 1 logical rack. • No restrictions on module placement • Maximum use of configuration/status and combination modules	• Inefficient I/O image table utilization
Complementary – 32	• you **don't** need full FLEX I/O module functionality, including combination modules (1794-IB10XOB6), settable input delay times on input modules (1794-IB16, -IB8S), and fuse blown indication (1794-OB8EP), for example. • you can locate equal numbers of input and output modules in separate chassis	• Eight modules in each chassis equal 2 logical racks • Provides maximum use of I/O image table in 2 FLEX chassis (when input modules are installed in 1 chassis, and output modules are installed in the complementary chassis).	• All digital I/O modules are configured as 32-point. • No combination modules allowed • Configuration/status data may not be accessible to user (depending on module type).

The amount of data accessible to the processor in the 3 addressing modes is illustrated below. Note that the shaded areas represent data not accessible by the processor.

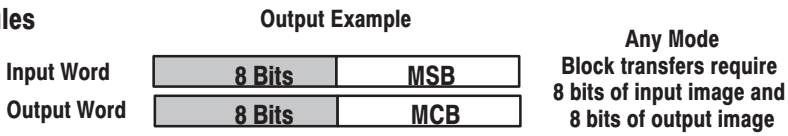
Digital I/O Modules


Input Module Example
Output Module Example
Input Word
Output Word
8 Bits
Standard Mode
16 bits of input and
16 bits of output available
Note: If 32 pt. modules are used in standard mode,
only the lower word will be sent to the processor.
Input Module Example
Output Module Example
Input Word 0
Input Word 1
Output Word 0
Output Word 1
Standard – 32 Mode
32 bits of input and
32 bits of output available
Input Module Example
Output Module Example
Input Word
Output Word
Compact Mode
16-pt Density
16 bits of input or
16 bits of output available
Note: If 32 pt. modules are used in 16 pt. compact mode,
only the low word will be sent to the processor.
Input Word
Output Word
Compact Mode
8-pt Density
8 bits of input or
8 bits of output available
Note: If 16-pt or 32-pt modules are used in 8-pt compact addressing,
only the information in the lowest byte will be sent to the processor.


16-bit Input modules complemented by 16-bit output modules
Primary Chassis
Input Word
Output Word
8 Bits
Complementary Mode
16-pt Density
16 bits of input or
16 bits of output available
Complement Chassis
Note: If 32-pt modules are used in 16-pt complimentary addressing, only the information in the lower word will be sent to the processor.
8-bit Input modules complemented by 8-bit output modules
Primary Chassis
Complementary Mode
8-pt Density
8 bits of input or
8 bits of output available
Complement Chassis
Note: If 16-pt or 32-pt modules are used in 8-pt complimentary addressing, only the information in the lowest byte will be sent to the processor.
Primary Chassis
Input Module Example
Output Module Example
Input Word 0
Input Word 1
Output Word 0
Output Word 1
Complementary – 32 Mode
32 bits of input or
32 bits of output available
Complementary Chassis
Input Module Example
Output Module Example
Complementary – 32 Mode
32 bits of input or
32 bits of output available
Note: Shaded areas represent data not accessible by the processor.

Analog (Block Transfer) Modules

Analog modules use block transfers, which require 1 byte (8 bits) of input image for the module status byte, and 1 byte (8 bits) of output image for the module control byte. This is true for any addressing mode selected.



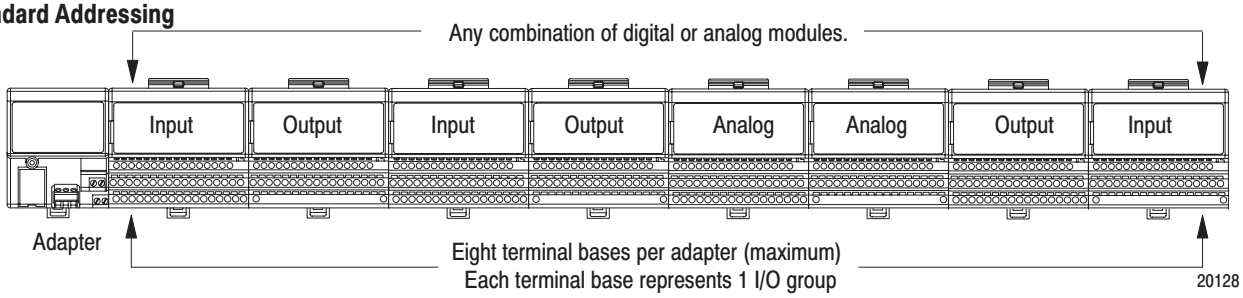
Standard Addressing

Use standard addressing when:

- you need full FLEX I/O module functionality, such as delay time selection on input modules, fuse-blown indication on the 1794-OB8EP, etc.
- using combination modules, such as the 1794-IB10XOB6 10 in/6 out module

In standard mode, each module position equals one I/O group – 1 word of input image and 1 word of output image. If 32-pt modules are used, only the lower 16 bits are available.

Standard Addressing



Standard Addressing Example – 8 modules = 1 logical rack

	I/O Group 0		I/O Group 1		I/O Group 2		I/O Group 3		I/O Group 4		I/O Group 5		I/O Group 6		I/O Group 7	
	M0		M1		M2		M3		M4		M5		M6		M7	
ASB/E	IH	IL	IH	IL	IH	IL	IH	IL		MSB		MSB	IH	IL	IH	IL
	OH	OL	OH	OL	OH	OL	OH	OL		MCB		MCB	OH	OL	OH	OL
	IB16		OB16		IB16		OB16		IE8		IE8		OB16		IB16	

IL = Input Low Byte
IH = Input High Byte
OL = Output Low Byte
OH = Output High Byte

MCB = Module Control Byte (output data)
MSB = Module Status Byte (input data)

Legal Module Placement in Standard Addressing
Any module in any slot

1 module position is an I/O group

Input Image Table

I/O Group	17 10	07 00
0	M0-IH	M0-IL
1	M1-IH	M1-IL
2	M2-IH	M2-IL
3	M3-IH	M3-IL
4		M4-MSB
5		M5-MSB
6	M6-IH	M6-IL
7	M7-IH	M7-IL

Output Image Table

17 10	07 00
M0-OH	M0-OL
M1-OH	M1-OL
M2-OH	M2-OL
M3-OH	M3-OL
	M4-MCB
	M5-MCB
M6-OH	M6-OL
M7-OH	M7-OL

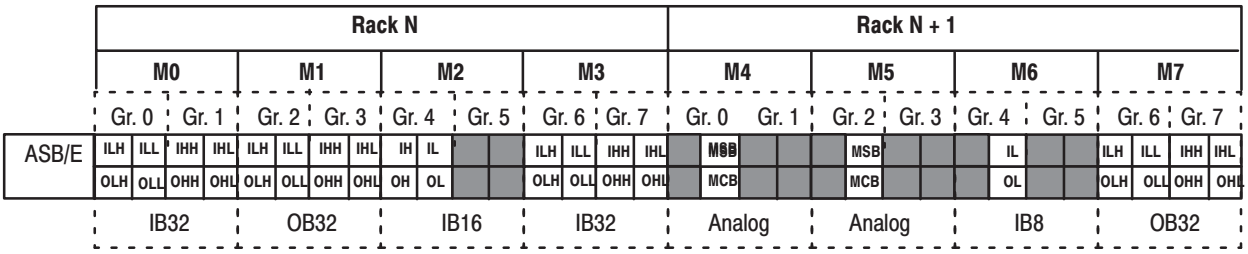
Standard – 32 Addressing

Use standard 32 point addressing when:

- you use 32 point modules in your system
- you need full FLEX I/O module functionality, such as delay time selection on input modules, fuse-blown indication on the 1794-OB8EP, etc.
- using combination modules, such as the 1794-IB16XOB16 16 in/16 out module

In standard – 32 mode, each module position equals two I/O groups – 2 words of input image and 2 words of output image.

Standard 32 Addressing Example – 8 modules = 2 logical racks, N and N+1



Note: Shaded areas represent data which is not available.

Eight terminal bases per adapter (maximum)
Each terminal base represents 2 I/O groups.

ILL, OLL = Bits 0 thru 7 for input and output words of 32 point modules
ILH, OLH = Bits 8 thru 15 for input and output words of 32 point modules
IHL, OHL = Bits 16 thru 23 for input and output words of 32 point modules
IHH, OHH = Bits 24 thru 32 for input and output words of 32 point modules
IL, OL = Bits 0 thru 7 for input and output words for 16 and 8 point modules
IH, OH = Bits 8 thru 15 for input and output words for 16 point modules
MCB = Module Control Byte (output data)
MSB = Module Status Byte (input data)

Legal Module Placement in Standard Addressing
Any module in any slot

1 module position is 2 I/O groups

Input Image Table for Rack N

I/O Group	17 10	07 00
0	M0-ILH	M0-ILL
1	M0-IHH	M0-IHL
2	M1-ILH	M1-ILL
3	M1-IHH	M1-IHL
4	M2-IH	M2-IL
5		
6	M3-ILH	M3-ILL
7	M3-IHH	M3-IHL

Output Image Table for Rack N

I/O Group	17 10	07 00
0	M0-OLH	M0-OLL
1	M0-OHH	M0-OHL
2	M1-OLH	M1-OLL
3	M1-OHH	M1-OHL
4	M2-OH	M2-OL
5		
6	M3-OLH	M3-OLL
7	M3-OHH	M3-OHL

Input Image Table for Rack N+1

I/O Group	17 10	07 00
0		M4-MSB
1		
2		M5-MSB
3		
4		M6-IL
5		
6	M7-ILH	M7-ILL
7	M7-IHH	M7-IHL

Output Image Table for Rack N+1

I/O Group	17 10	07 00
0		M4-MCB
1		
2		M5-MCB
3		
4		M6-OL
5		
6	M7-OLH	M7-OLL
7	M7-OHH	M7-OHL

Compact Addressing

Use compact addressing when:

- you are not using combination modules
- you are using only digital input, digital output and analog modules
- you don't need all the features of digital FLEX I/O modules (You can only access the input word on an input module, or the output word of an output module. Any status information/configuration information in the corresponding input/output word is not accessible.)
- you can locate equal numbers of input and output modules in a single chassis
- you want more efficient use of the input/output data table

Compact Mode

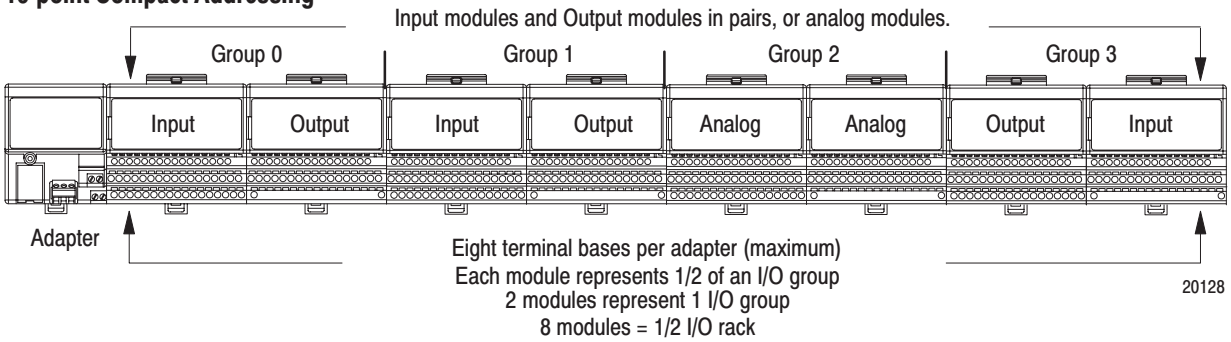
Compact mode maximizes single chassis I/O image table usage when using either 8- or 16-point modules and block transfer modules.

Compact mode allows more than 1 module to occupy a single I/O group. How many modules depends on the density selected (16- or 8-point).

In compact mode, with 16-point density, 2 digital modules (1 input and 1 output module) can occupy 1 I/O group. In addition, 2 block transfer modules can occupy 1 I/O group. If higher density modules are used, only the lowest 16 bits will be available.

In compact mode, with 8-point density, 4 digital modules (2 input and 2 output modules) can occupy 1 I/O group. In addition, 2 block transfer modules can occupy 1 I/O group. If higher density modules are used, only the lowest 8 bits will be available.

16-point Compact Addressing



Compact 16-point Addressing Example – 8 modules = 1/2 logical rack

	I/O Group 0				I/O Group 1				I/O Group 2				I/O Group 3			
	M0		M1		M2		M3		M4		M5		M6		M7	
ASB/E	IH	IL			IH	IL				MSB		MSB			IH	IL
			OH	OL			OH	OL		MCB		MCB	OH	OL		
	IB16		OB16		IB16		OB16		IE8		IE8		OB16		IB16	

IL = Input Low Byte
IH = Input High Byte
OL = Output Low Byte
OH = Output High Byte

MCB = Module Control Byte (output data)
MSB = Module Status Byte (input data)

Note: Shaded areas represent unavailable data

Legal Module Placement in 16-pt Compact Addressing

A 16-point input module and a 16-point output module (or an empty slot) in an I/O group.

A 16-pt output module and a 16-pt input module (or an empty slot) in an I/O group.

A block transfer module with another block transfer module (or an empty slot) in an I/O group.

An empty slot with any module, or another empty slot in an I/O group.

2 module positions = an I/O group

Input Image Table

I/O Group	17 10	07 00
0	M0-IH	M0-IL
1	M2-IH	M2-IL
2	M5-MSB	M4-MSB
3	M7-IH	M7-IL
4		
5		
6		
7		

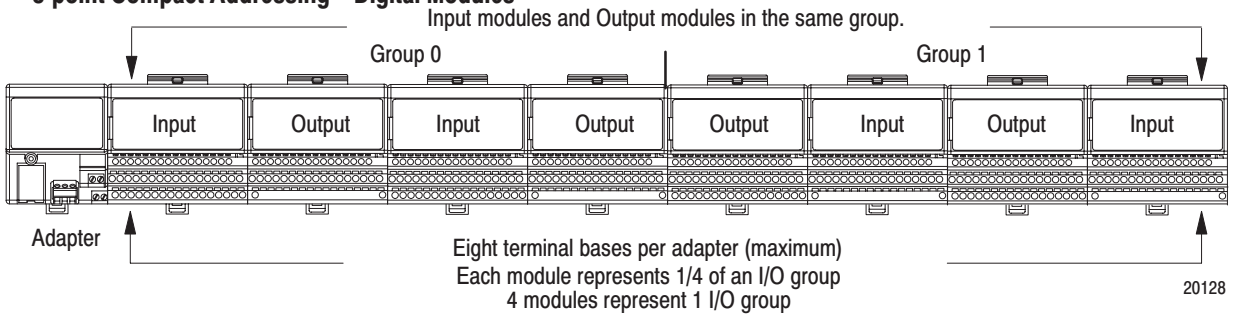
Output Image Table

17 10	07 00
M1-OH	M1-OL
M3-OH	M3-OL
M5-MCB	M4-MCB
M6-OH	M6-OL

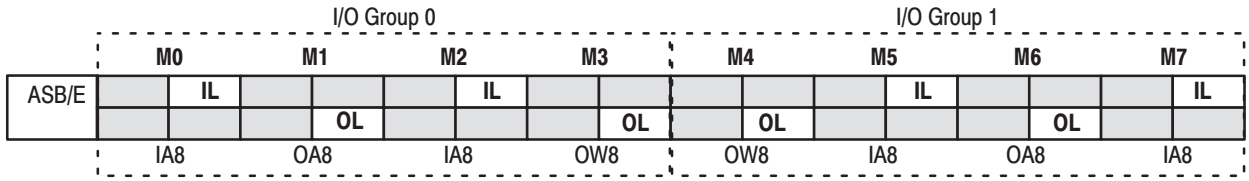
I/O groups 4–7 are available for another adapter.

Note: When using block transfer modules in 16-pt compact addressing, address module positions M0, M2, M4 and M6 as module "0" in a block transfer instruction block; address module positions M1, M3, M5 and M7 as module "1" in a block transfer instruction block.

8-point Compact Addressing – Digital Modules



Compact 8-point Addressing Example – 8 digital modules = 1/4 logical rack



IL = Input Low Byte
IH = Input High Byte
OL = Output Low Byte
OH = Output High Byte

Note: Shaded areas represent unavailable data

Legal Module Placement in 8-point Compact Addressing
Two 8-point input modules and two 8-point output modules (or empty slots) in an I/O group. Module type must alternate within an I/O group: input, output, etc.

One block transfer module with 3 empty slots

One block transfer module, followed by an empty slot, another block transfer module and another empty slot.

4 module positions to an I/O group

Input Image Table

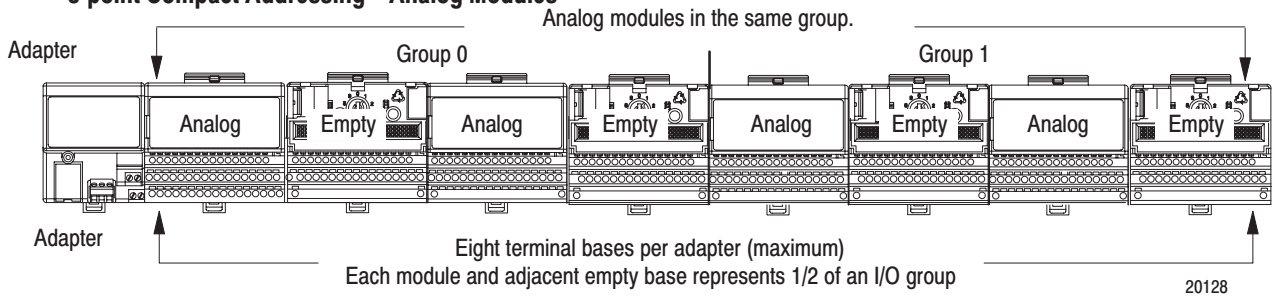
I/O Group	17 10	07 00
0	M2-IL	M0-IL
1	M7-IL	M5-IL
2		
3		
4		
5		
6		
7		

Output Image Table

17 10	07 00
M3-OL	M1-OL
M6-OL	M4-OL

I/O groups 2–7 are available to additional adapters.

8-point Compact Addressing – Analog Modules



Compact 16-point Addressing Example – 8 modules = 1/2 logical rack

	I/O Group 0				I/O Group 1				I/O Group 2				I/O Group 3			
	M0		**M1**		**M2**		**M3**		**M4**		**M5**		**M6**		**M7**	
ASB/C	**IH**	**IL**			**IH**	**IL**				**MSB**		**MSB**			**IH**	**IL**
			OH	**OL**			**OH**	**OL**		**MCB**		**MCB**	**OH**	**OL**		
	IB16		OB16		IB16		OB16		IE8		IE8		OB16		IB16	

IL = Input Low Byte
IH = Input High Byte
OL = Output Low Byte
OH = Output High Byte

MCB = Module Control Byte (output data)
MSB = Module Status Byte (input data)

Note: Shaded areas represent unavailable data

Legal Module Placement in 16-pt Compact Addressing

A 16-point input module and a 16-point output module (or an empty slot) in an I/O group

A block transfer module and another block transfer module (or an empty slot) in an I/O group.

An empty slot and any module (or another empty slot) in an I/O grouop.

2 module positions = an I/O group

Input Image Table

I/O Group	17 10	07 00
0	M0-IH	M0-IL
1	M2-IH	M2-IL
2	M5-MSB	M4-MSB
3	M7-IH	M7-IL
4		
5		
6		
7		

Output Image Table

17 10	07 00
M1-OH	M1-OL
M3-OH	M3-OL
M5-MCB	M4-MCB
M6-OH	M6-OL

I/O groups 4–7 are available for another adapter.

Note: When using block transfer modules in 16-pt compact addressing, address module positions M0, M2, M4 and M6 as module "0" in a block transfer instruction block; address module positions M1, M3, M5 and M7 as module "1" in a block transfer instruction block.

Complementary Addressing Mode

Use complementary addressing when:

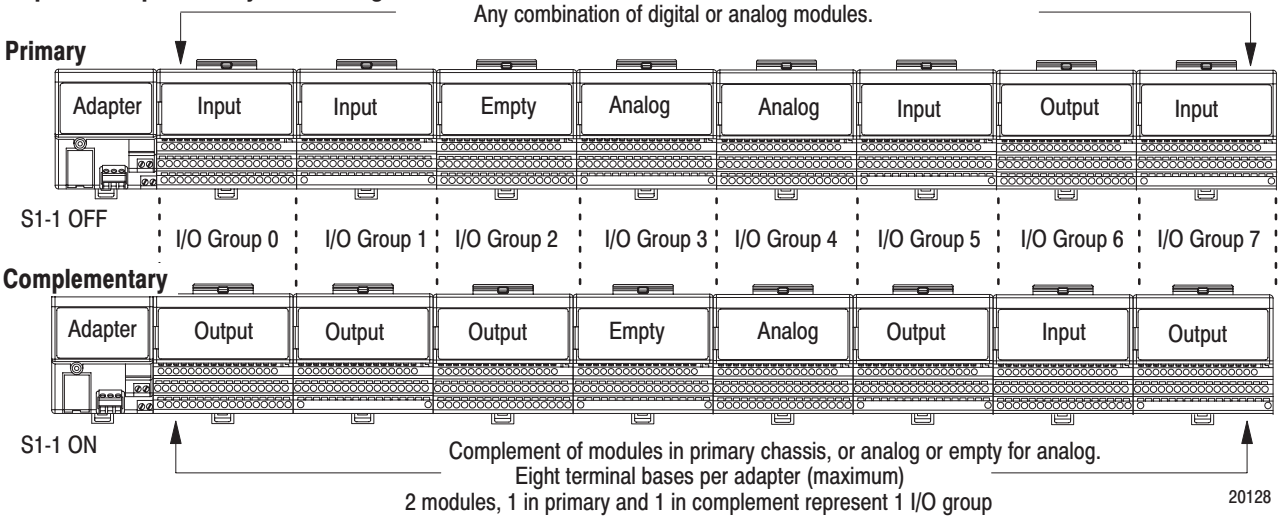
- you are not using combination modules
- you don't need all the features of FLEX I/O modules
- you can locate equal numbers of input and output modules in separate chassis
- you want more efficient use of the input/output image table

Complementary Mode – 16-point

Complementary mode maximizes 2 chassis I/O image table usage when input modules are installed in 1 chassis, and output modules are installed in another chassis. This mode allows 2 modules to occupy a single I/O group.

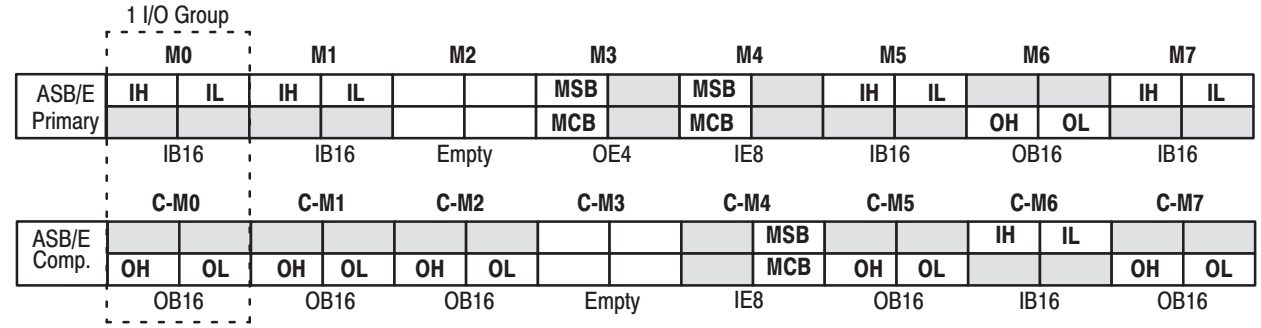
In complementary mode, with 16-point density, 1 digital input module in the primary chassis, and 1 digital output module in the complementary chassis, or vice versa, form an I/O group. In addition, analog modules can be complemented by another analog module or an empty base. If 32-pt modules are used, only the lowest 16 bits will be available.

16-point Complementary Addressing



Note: When programming block transfers, address analog modules as module 0 if switch S1-1 is on; module 1 if switch S1-1 is off.

Complementary 16-point Addressing Example – Up to 16 modules = 1 logical rack



IL = Input Low Byte
IH = Input High Byte
OL = Output Low Byte
OH = Output High Byte

MCB = Module Control Byte
MSB = Module Status Byte

Note: Shaded areas represent unavailable data

Legal Module Placement in 16-point Complementary

Any module or empty slot in any I/O position of the primary chassis; input modules complemented by output modules, or empty slots; output modules complemented by input modules or empty slots; block transfer modules complemented by block transfer modules or empty slots; or empty slots complemented by input, output, or empty slots.

Input Image Table

I/O Group	17 10	07 00
0	M0-IH	M0-IL
1	M1-IH	M1-IL
2		
3	M3-MSB	
4	M4-MSB	C-M4-MSB
5	M5-IH	M5-IL
6	C-M6-IH	C-M6-IL
7	M7-IH	M7-IL

Output Image Table

17 10	07 00
C-M0-OH	C-M0-OL
C-M1-OH	C-M1-OL
C-M2-OH	C-M2-OL
M3-MCB	
M4-MCB	C-M4-MCB
C-M5-OH	C-M5-OL
M6-OH	M6-OL
C-M7-OH	C-M7-OL

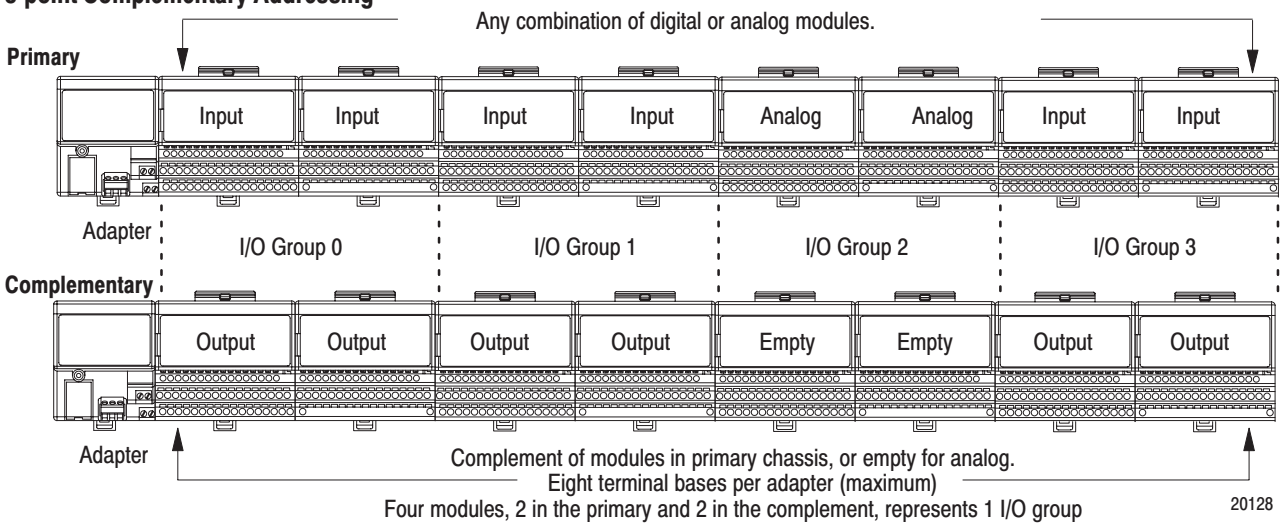
Note: When programming block transfer instructions, address analog modules in the primary rack as module "1," and analog modules in the complementary rack as module "0."

Complementary Mode – 8-point

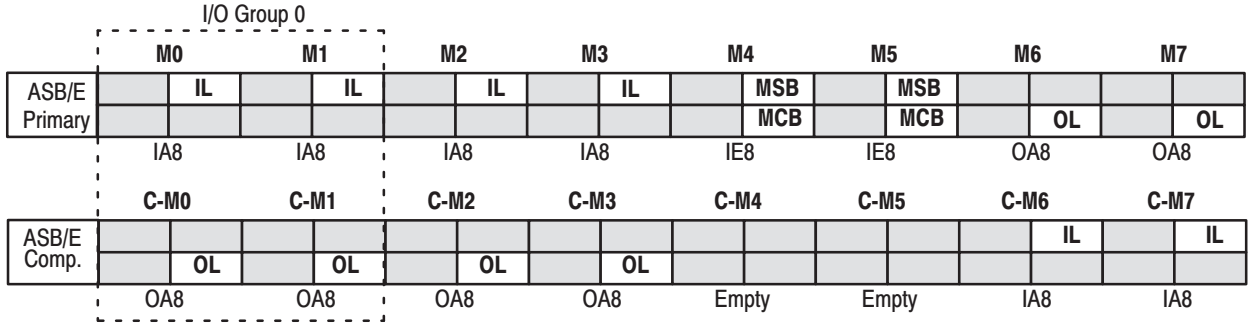
Complementary mode maximizes chassis I/O image table usage when input modules are installed in one chassis, and output modules are installed in a complementary chassis. This allows four modules to occupy a single I/O group.

In complementary mode, with 8-point density, 2 digital input modules in the primary chassis, and 2 digital output modules in the complementary chassis, or vice versa, form an I/O group. In addition, analog modules must be complemented by an empty base. If higher density modules are used, only the lowest 8 bits will be available.

8-point Complementary Addressing



Complementary 8-point Addressing Example – up to 16 modules = 1/2 logical rack



IL = Input Low Byte
IH = Input High Byte
OL = Output Low Byte
OH = Output High Byte
MCB = Module Control Byte
MSB = Module Status Byte

Note: Shaded areas represent unavailable data

Legal Module Placement in 8-point Complementary

2 inputs in a group complemented by 2 outputs or empty slots
2 outputs in a group complemented by 2 inputs or empty slots
2 block transfer modules complemented by 2 empty slots
1 block transfer module and 1 input in a group complemented by 1 empty slot and 1 output module
Empty slots complemented by an empty slot, input or output slot

Input Image Table

I/O Group	17 10	07 00
0	M1-IL	M0-IL
1	M3-IL	M2-IL
2	M5-MSB	M4-MSB
3	C-M7-IL	C-M6-IL
4		
5		
6		
7		

Output Image Table

17 10	07 00
C-M1-OL	C-M0-OL
C-M3-OL	C-M2-OL
M5-MCB	M4-MCB
M7-OL	M6-OL

I/O groups 4–7 are available to additional adapters.

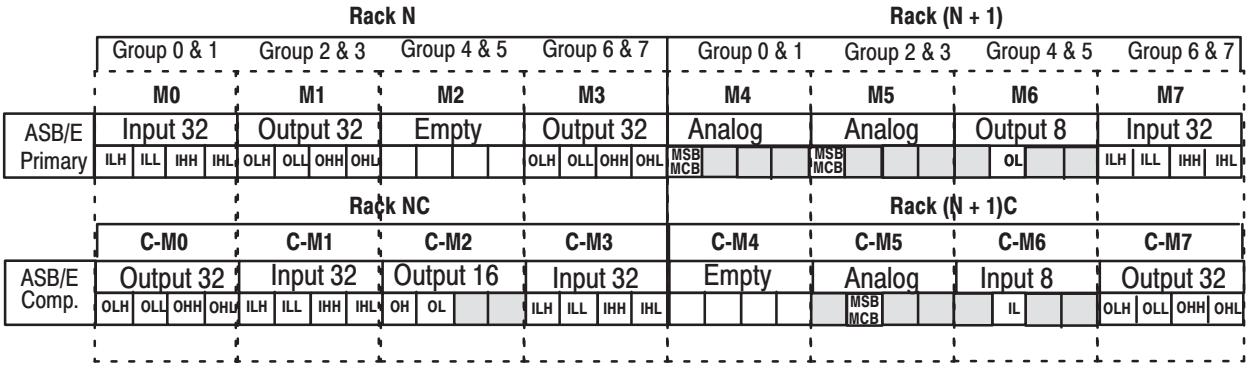
Complementary – 32 Addressing

Use complementary 32 point addressing when:

- you use 32 point modules in your system
- you need full FLEX I/O module functionality, such as delay time selection on input modules, fuse-blown indication on the 1794-OB8EP, etc.
- using combination modules, such as the 1794-IB16XOB16 16 in/16 out module

In complementary mode, each module position equals two I/O groups – 2 words of input image and 2 words of output image.

Complementary 32 Addressing Example – 8 modules = 2 logical racks, N and N+1



Eight terminal bases per adapter (maximum)
1 module in primary chassis, 1 module in complementary chassis represents 2 I/O groups.

ILL, OLL = Bits 0 thru 7 for input and output words of 32 point modules
ILH, OLH = Bits 8 thru 15 for input and output words of 32 point modules
IHL, OHL = Bits 16 thru 23 for input and output words of 32 point modules
IHH, OHH = Bits 24 thru 32 for input and output words of 32 point modules
IL, OL = Bits 0 thru 7 for input and output words for 16 and 8 point modules
IH, OH = Bits 8 thru 15 for input and output words for 16 point modules

Note: Shaded areas represent unavailable data

Legal Module Placement in 32-point Complementary

Any module in any slot in primary chassis. Complement of primary chassis module in complementary chassis slot.
Any input module complemented by an output module or empty slot.
Any output module complemented by an input module or empty slot.
Any block transfer module complemented with a block transfer module or empty slot.
An empty slot complemented by an empty slot, input or output module

Input Image Table for Rack N and NC

I/O Group	17 10	07 00
0	M0-ILH	M0-ILL
1	M0-IHH	M0-IHL
2	CM1-ILH	CM1-ILL
3	CM1-IHH	CM1-IHL
4		
5		
6	CM3-ILH	CM3-ILL
7	CM3-IHH	CM3-IHL

Output Image Table for Rack N and NC

I/O Group	17 10	07 00
0	CM0-OLH	CM0-OLL
1	CM0-OHH	CM0-OHL
2	M1-OLH	M1-OLL
3	M1-OHH	M1-OHL
4	CM2-OH	CM2-OL
5		
6	M3-OLH	M3-OLL
7	M3-OHH	M3-OHL

Input Image Table for Rack N+1 and (N+1)C

I/O Group	17 10	07 00
0	M4-MSB	
1		
2	M5-MSB	CM5-MSB
3		
4		CM6-IL
5		
6	M7-ILH	M7-ILL
7	M7-IHH	M7-IHL

Output Image Table for Rack N+1 and (N+1)C

I/O Group	17 10	07 00
0	M4-MCB	
1		
2	M5-MCB	CM5-MCB
3		
4		M6-OL
5		
6	CM7-OLH	CM7-OLL
7	CM7-OHH	CM7-OHL

Mapping Data into the Image Tables

After the rack size has been determined by the remote I/O adapter, the data from the modules must be mapped into the data tables. Data associated with digital modules is mapped into the input and output image table.

Data transfer to and from the remote I/O adapter and digital modules occurs every flexbus scan. This data is mapped into the input/output image table.

IMPORTANT The switch settings on the adapter module determine whether both the input and output bits are transferred. Standard addressing is the only mode that maps both input and output bits for each module.

For analog modules, only the MSB and MCB block transfer bytes are mapped into the input and output image table. The remote I/O adapter transfers data to analog I/O modules (block transfer write) and from analog I/O modules (block transfer read) using BTW and BTR instructions in your ladder diagram program. This data is mapped to the data files selected in the ladder logic block transfer instructions.

The adapter identifies the type of module in each base unit when the module is added, and stores this information for later use, if necessary.

IMPORTANT If you are changing your configuration, you must power down, then power back up after changing a module type in a terminal base unit.

ATTENTION In Standard Addressing Mode, FLEX I/O modules do not support complementary I/O. Do not attempt to use the complementary image table word of a module in Standard Addressing Mode. The complementary word is reserved for use by the module.

Determining Rack Size

After the remote I/O adapter has identified the modules present in its system, it creates a “rack image” so data transfer can take place using the remote I/O protocol.

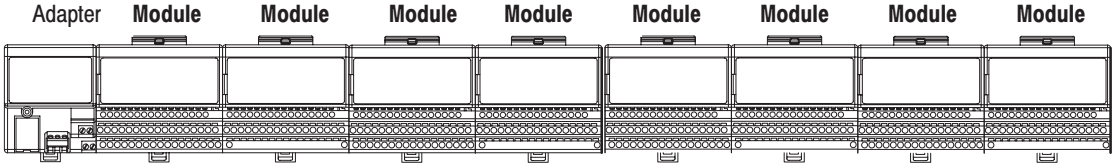
Building a rack image consists of:

- mapping each module to an I/O group (16 bits of input and 16 bits of output)
- determining rack size – all empty terminal bases are counted unless they occur at the end of the rack
- automatically sizing the rack image, based upon the mode switch setting

- smallest rack size is 1/4, regardless of the mode switch settings

Some examples of rack definition are shown below.

Example 1 – 8 Terminal Bases, 8 Modules

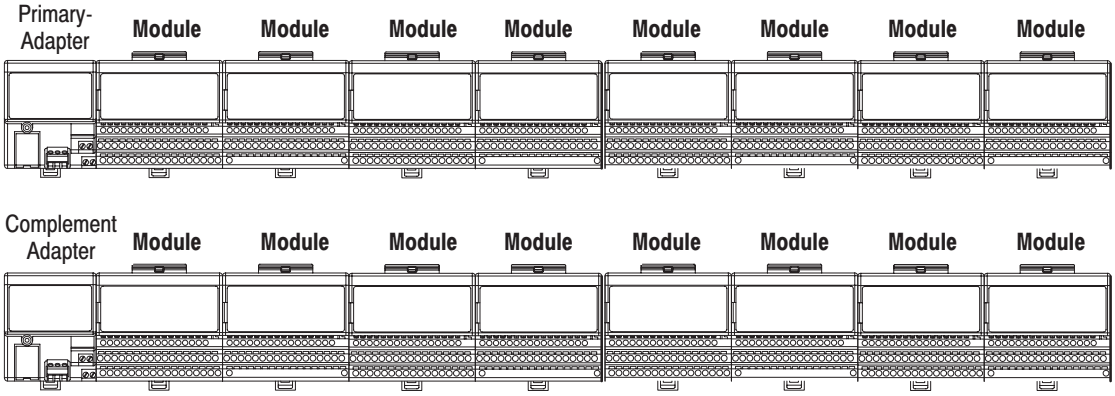


= 2 Logical Racks in Standard 32 mode, any density or analog module mix

= 1 Logical Rack in Standard mode, any density or analog module mix

= 1/4 Rack in Compact mode with 8-pt modules; 1/2 Rack in Compact mode (with 16-pt modules)

Example 2 – 16 Terminal Bases, 16 Modules, Complementary Mode



= 2 Logical Racks in Complementary 32 mode (16 modules total, any density),

= 1 Logical Rack in Complementary mode (16 16-pt modules), primary input modules – complement output modules and vice versa; analog complemented with another analog module or an empty slot

= 1/2 Rack in Complementary mode (16 8-pt modules), primary input modules – complement output modules and vice versa; analog complemented with an empty slot

Last Module Position	Rack Size for each Addressing Mode						
	Standard 32	Standard	Compact 16	Compact 8	Complement 32	Complement 16	Complement 8
0	1/4 rack	1/4 rack	1/4 rack	1/4 rack	1/4 rack	1/4 rack	1/4 rack
1	1/2 rack	1/4 rack	1/4 rack	1/4 rack	1/2 rack	1/4 rack	1/4 rack
2	3/4 rack	1/2 rack	1/4 rack	1/4 rack	3/4 rack	1/2 rack	1/4 rack
3	Full rack	1/2 rack	1/4 rack	1/4 rack	Full rack	1/2 rack	1/4 rack
4	1–1/4 rack	3/4 rack	1/2 rack	1/4 rack	1–1/4 rack	3/4 rack	1/2 rack
5	1–1/2 rack	3/4 rack	1/2 rack	1/4 rack	1–1/2 rack	3/4 rack	1/2 rack
6	1–3/4 rack	Full rack	1/2 rack	1/4 rack	1–3/4 rack	Full rack	1/2 rack
7	2 Full racks	Full rack	1/2 rack	1/4 rack	2 Full racks	Full rack	1/2 rack

If a rack size offset by the selected quarter results in more than a full rack, the adapter will declare a rack fault and error as indicated.

In 32 point mode, the starting quarter should always be 0 (switches S1–8 and S1–7 on).

ATTENTION

Do not use the auto-config feature of 6200 software when using a PLC-3 processor with 1775-S4A or 1775-S4B scanner modules. If you do an auto-config for a scanner channel containing 1 or more 1794-ASB adapters with that configuration, the adapters may not show up in the scan list for that scanner channel. Manually insert these adapters into the scan list for the scanner.

Operating Modes

Most reset commands are issued by the processor when it is placed in the PROG mode. However, the processor automatically issues a special command to any rack declared faulted regardless of the processor mode.

When this special command is received by the faulted remote I/O adapter, and processor restart lockout (PRL) has not been selected, the adapter will:

- continue to read output image data from the link, and queue block transfers if MCBs are detected
- reset all bits in the output words of digital modules
- reset all bits in the write words of analog modules up to but not including the write words of the safe state values
- assigns safe state values to outputs of analog modules
- issue a reply command

If processor restart lockout (PRL) has been selected, the adapter does not update data, does not issue a reply command, and does not clear the fault.

Chapter Summary

In this chapter, you learned how to address your I/O, how to determine rack size, and how the modules are mapped

Troubleshooting

Chapter Objectives

In this chapter, we tell you:

- about the indicators on the module front plate
- how to use the indicators for troubleshooting the module

Fault Conditions

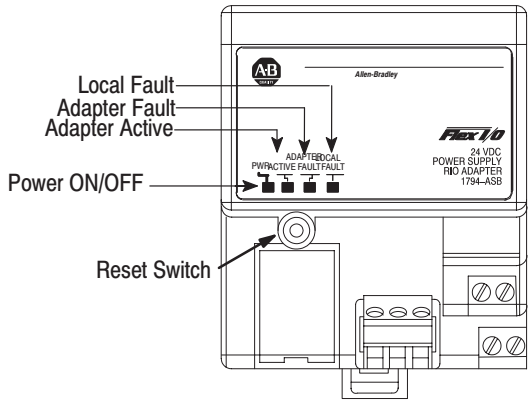
Three conditions can cause the remote I/O adapter to declare a communication fault.

- no remote I/O (link) communication for more than 100ms
- no commands issued to this address over the remote I/O link within the last 255 link transactions
- communication is lost to a module when Rack Fault Select is enabled

When any of these conditions exist, the adapter will:

- reset all digital outputs or leave them in their last state (depending on the position of the last state switch, **S2-1**). Refer to page 2–9 for an explanation of analog module responses.

A communication fault will be automatically cleared by a command from the processor if PRL (processor restart lockout) is not selected, or by pressing the reset switch on the front of the module if PRL is selected.

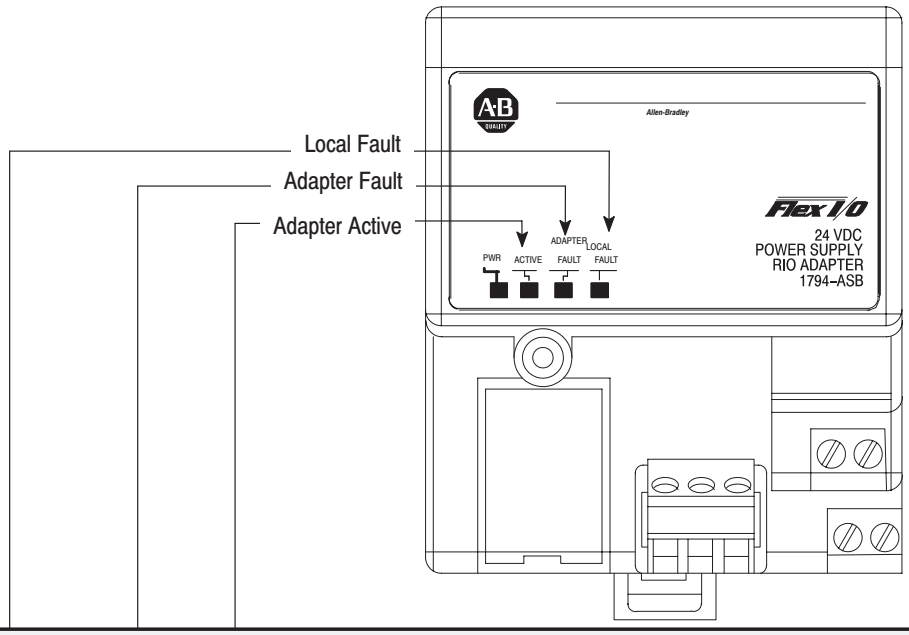


Important: Cycling power to the adapter will also reset faults. However, any queued block transfers will be lost, and all outputs will turn off, regardless of the position of the last state switch.

Troubleshooting with the Indicator Lights

The module has indicators on the front plate as shown below. Use these indicators for troubleshooting the module. The following tables describes problems that may occur, probable causes, and recommended courses of action.

Table 4.A
Remote I/O System Troubleshooting Guide



Communication States and Module Display					
Local Fault	**Adapter Fault**	**Adapter Active**	**Operating State**	**Actions**	**Fault Reset**
Off	Off	On	Normal Communications	Outputs enabled. Communicating with scanner	Not applicable
Off	Off	Blinking	Program or Test mode	Outputs disabled Communicating with scanner Sending current input status back to scanner.	Not applicable
Off	Off	Off	Communication (lack of communications)	All modules; digital outputs in the rack follow HLS setting. Refer to page 2–9 for analog output action.	Resume proper communications (if no processor restart lockout)
Off	Blinking alternately		Processor lockout in effect during communications by scanner	Outputs follow last state switch setting. No replies sent to scanner	Press Reset button on front of adapter module (or cycle power) and resume proper communication.

Module Faults					
Local Fault	**Adapter Fault**	**Adapter Active**	**Fault Condition**	**Actions**	**Fault Reset**
On	On	Off	Noise problems on I/O bus	All outputs off. Communications off.	Cycle power. (This fault is a fatal fault.)
On	Off	Following Link Status	Different module installed replacing removed module.	Old inputs maintained. Outputs set to zero.	Auto-reset when incorrect module is removed; or cycle power to establish new identification for module.
Blinking	Off	On	Module not responding. Possibly module removed under power. Only module removed is affected.	Module not responding: Old inputs maintained. Outputs set to zero. All other modules: Outputs active (enabled). Sending current input status back to scanner.	Replace same module; or cycle power to establish new identification for module.
Processor in RUN mode Rack Fault Select NOT enabled					

Module Faults					
Local Fault	**Adapter Fault**	**Adapter Active**	**Fault Condition**	**Actions**	**Fault Reset**
Blinking	OFF	Blinking	Module not responding. Possibly module removed under power. Only module removed is affected.	Module not responding: Old inputs maintained. Outputs set to to zero. All other modules: Outputs disabled. Sending current input status back to scanner.	Replace same module; or cycle power to establish new identification for module.
Processor in PROG/TEST mode Rack Fault Select NOT enabled					
Blinking	Off	Blinking	Module not responding. Possibly module removed under power. Only module removed is affected.	Module not responding. All outputs set to 0. All other modules; digital outputs in the rack follow HLS setting. Refer to page 2–9 for analog output action. No replies sent to scanner.	Replace same module; or cycle power to establish new identification for module.
Processor in RUN/PROG/TEST Rack Fault Select enabled					

Configuration Faults					
Local Fault	**Adapter Fault**	**Adapter Active**	**Fault Condition**	**Actions**	**Fault Reset**
Off	Blinking in unison		Incorrect starting I/O group number.	Not applicable.	Turn power off. Set SW1 and SW2 correctly. Turn power on.
On	On	On	Incorrect baud rate setting.		
Blinking in sequence			Another adapter on the link has the same address.		
Blinking	On	Off	Illegal module placement – compact addressing mode selected.	Not applicable.	Correct module placement and cycle power.

Additional Faults and Module Displays					
Local Fault	**Adapter Fault**	**Adapter Active**	**Fault Condition**	**Actions**	**Fault Reset**
Off	On	Off	Random Access Memory fault.	Reset outputs. Stop communicating on remote I/O link.	Cycle power. (This may not correct fault.) If this does not correct the fault, replace the module with a known good module, and return the bad module to the factory for repair.
			Read Only Memory fault (on powerup only).	Outputs remain reset. Communication never starts.	
			Internal watchdog timer timed out.	Try to reset outputs. Stops communicating on the remote I/O link.	

Chapter Summary

In this chapter you learned how to use the indicators on the front of the module to troubleshoot your module.

Specifications

1794-ASB Series E Specifications	
Note: This adapter cannot be used with PLC-2 processors This adapter can communicate with FLEX Integra analog modules and 32–point FLEX modules.	
I/O Capacity	8 modules
Power Supply	**Note:** In order to comply with CE Low Voltage Directives, you must use a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter.
Input Voltage Rating	24V dc nominal
Input Voltage Range	11.0V to 31.2V dc (includes 5% ac ripple)
Communication Rate	57.6k bps 115.2k bps 230.4k bps
Indicators	Power – green Adapter Active – green Adapter fault – red Local fault – red
Flexbus Output Current	640mA maximum
Isolation Voltage	500V ac between user power and flexbus
Power Consumption	330mA at 24V; 730mA at 12V
Power Dissipation	4.6W maximum @ 31.2V dc
Thermal Dissipation	15.7 BTU/hr @ 31.2V dc
Environmental Conditions	
Operating Temperature	IEC 60068–2–1 (Test Ad, Operating Cold) IEC 60068–2–2 (Test Bd, Operating Dry Heat) IEC 60068–2–14 (Test Nb, Operating Thermal Shock) 32 to 131°F (0 to 55°C)
Storage Temperature	IEC 60068–2–1 (Test Ab, Unpackaged, Nonoperating Cold) IEC 60068–2–2 (Test Bb, Unpackaged, Nonoperating Dry Heat) IEC 60068–2–14 (Test Na, Unpackaged, Nonoperating Thermal Shock) –40 to 185°F (–40 to 85°C)
Relative Humidity	IEC 60068–2–30 (Test Db, Unpackaged, Nonoperating Damp Heat) 5 to 95%, noncondensing
Shock Operating Nonoperating	IEC 60068–2–27 (Test Ea, Unpackaged Shock) 30g 50g
Vibration	IEC 60068–2–6 (Test Fc, Operating) 5g @ 10–500Hz
ESD Immunity	IEC 61000–4–2 4kV contact discharges 8kV air discharges
Radiated RF Immunity	IEC 61000–4–3 10V/m with 1kHz sine–wave 80% AM from 30MHz to 2000MHz
EFT/B Immunity	IEC 61000–4–4 +4kV @ 2.5kHz on power ports ±2kV @ 5kHz on communications ports
Specifications continued on next page	

1794-ASB Series E Specifications	
Surge Transient Immunity	IEC 61000–4–5 ±1kV line–line (DM) and ±2kV line–earth (CM) on signal ports
Conducted RF Immunity	IEC 61000–4–6 10V rms with 1kHz sine wave 80% AM from 150kHz to 80MHz
Emissions	CISPR 11 Group 1, Class A (with appropriate enclosure)
Enclosure Type Rating	None (open–style)
Remote I/O Cable	Belden 9463 or equivalent as specified in publication ICCG-2.2
Remote I/O Connector Plug	Part Number 942029–03
Power Conductors Wire Size Category	 12 gauge (4mm^2) maximum sokid or stranded wire rated at 75°C or greater 3/64 inch (1.2mm) insulation max. 2[1]
Agency Certification (when product is marked)	UL UL Listed Industrial Control Equipment UL UL Listed for Class I, Division 2 Group A, B, C and D Hazardous Locations CSA CSA Certified Process Control Equipment for Class I, Division 2 Group A, B, C, D Hazardous Locations EEx[2] European Union 94/9/EEC ATEX Directive, compliant with EN 50021; Potentially Explosive Atmospheres, Protection “n” CE[2] European Union 89/336/EEC EMC Directive, compliant with: EN 50081–2, Industrial Emissions; EN 50082–2, Industrial Immunity; EN 61326, Meas./Control/Lab., Industrial Requirements; EN 61000–6–2, Industrial Immunity C–Tick[2] Australian Radiocommunications Act,compliant with: AS/NZS 2064, Industrial Emissions
Publications	Installation Instructions 1794–IN046

1 Use this conductor category information for planning conductor routing. Refer to publication 1770-4.1, “Industrial Automation Wiring and Grounding Guidelines.”

2 See the Product Certification link at www.ab.com for Declarations of Conformity, Certificates and other certification details

European Zone 2 Certification

This equipment is intended for use in potentially explosive atmospheres as defined by European Union Directive 94/9/CE.

The LCIE (Laboratoire Central des Industries Electriques) certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of Category 3 equipment intended for use in potentially explosive atmospheres, given in Annex II to this Directive. The examination and test results are recorded in confidential report No. 28 682 010.

Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 50021 (1999).

IMPORTANT Observe the following additional Zone 2 certification requirements:

- This equipment is not resistant to sunlight or other sources of UV radiation.
- The secondary of a current transformer shall not be open–circuited.
- The marking “ALCR” is to be considered “as applicable” to individual products.
- Equipment of lesser Enclosure Type Rating must be installed in an enclosure providing at least IP54 protection when applied in Class I, Zone 2 environments.
- This equipment must be powered by energy limited associated equipment as defined in EN 50021 when applied in Class I, Zone 2 environments.
- Provision shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 40% when applied in Class I, Zone 2 environments.

Differences Between Remote I/O Adapter Series A, B, C, D and E

Major differences between adapter series are indicated in the following table.

<table>
<tr><th></th><th>Series A</th><th>Series B</th><th>Series C</th><th>Series D</th><th>Series E</th></tr>
<tr><td>Processor compatibility</td><td colspan="2">Can be used with PLC-2 processors</td><td colspan="3">Cannot be used with PLC-2 processors</td></tr>
<tr><td>Standard Mode – Analog module removal under power</td><td>Block transfers continue when a block transfer module is removed from its base.</td><td colspan="4">Ceases to do block transfers and a block transfer bit is set when a block transfer module is removed from the chassis. This error bit provides feedback to the processor that a block transfer module has been removed.</td></tr>
<tr><td>Local Fault Indication</td><td colspan="2">Local Fault Indicator only</td><td colspan="3">With Rack Fault Select enabled, local fault indication sent to scanner, and local fault indicator lighted. With Rack Fault Select disabled, local fault indicator lights.</td></tr>
<tr><td rowspan="2">Addressing</td><td colspan="2">No complementary addressing</td><td rowspan="2">Three modes of addressing: Standard, Compact, and Complementary</td><td rowspan="2">Five modes of addressing: Standard, Compact, Complementary, Standard 32, and Complementary 32</td></tr>
<tr><td colspan="2">Standard mode of addressing only</td></tr>
<tr><td>Hold Inputs</td><td>When hold inputs is enabled, the adapter retains the last memory image present when a module is removed from the terminal base.</td><td colspan="4">The hold inputs feature applies only to digital modules. When hold inputs is enabled, the adapter retains the last memory image present when a digital module is removed from the terminal base. This feature does not apply to analog modules. If you need this feature for analog modules, you must simulate it in your programming.</td></tr>
<tr><td>European Union Directives Compliance</td><td>Does not comply with European Union Directives. NO CE mark.</td><td colspan="4">Complies with European Union Directives. Has CE mark.</td></tr>
<tr><td>Module Removal and Insertion Under Power (RIUP)</td><td colspan="2">Always enabled.</td><td colspan="3">No module removal and insertion under power when Rack Fault Select is enabled.</td></tr>
<tr><td>Recognize 1793 Integra analog modules</td><td colspan="3">Cannot recognize 1793 Integra analog modules</td><td colspan="2">Can recognize 1793 Integra analog modules</td></tr>
</table>

Safety Approvals

The following information applies when operating this equipment in hazardous locations:

Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, and D Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.

WARNING

EXPLOSION HAZARD –

- Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.
- Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.
- Substitution of components may impair suitability for Class I, Division 2.
- If this product contains batteries, they must only be changed in an area known to be nonhazardous.

Informations sur l'utilisation de cet équipement en environnements dangereux:

Les produits marqués CL I, DIV 2, GP A, B, C, D ne conviennent que une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un systéme, le code de température le plus défavorable (code de température le plus faible) peut eatre utilisé pour déterminer le code de température global du systéme. Les combinaisons d'equipements dans le systéme sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.

AVERTISSEMENT

RISQUE D'EXPLOSION –

- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit.
- La substitution de composants peut rendre cet équipement inadapté à une utilisation en environnement de Classe 1, Division 2.
- S'assurer que l'environnement est classé non dangereux avant de changer les piles.

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